A black and white photograph of a quarry. In the foreground, a large truck is driving away from the viewer on a dirt road. Behind it, two more trucks are visible. The road is flanked by steep, rocky cliffs. In the background, a large pile of crushed rock is visible. The sky is bright and hazy.

THE INDUSTRY'S RECOGNIZED AUTHORITY

ROCK PRODUCTS

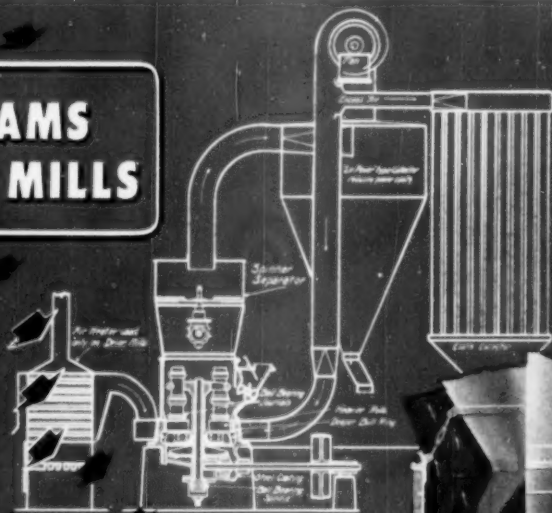
LARGEST PRODUCER CIRCULATION IN THE HISTORY OF THE FIELD

NOVEMBER 1950

Hauling slate from quarry
to crusher at Delta, Pa.

For those Fine Grinding Jobs . . .

WILLIAMS ROLLER MILLS



Blueprint illustration—
Williams drying,
grinding and
separating unit.

let's look at the record

LIMESTONE

Many Williams Roller Mills are satisfactorily grinding limestone to 99% 525 mesh or 85% 200 mesh and for all other commercial uses finer than 40 mesh.

LIME

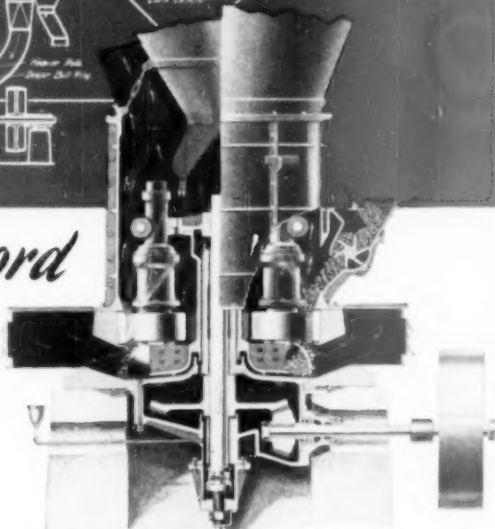
Both burned and hydrated lime can be satisfactorily processed in Williams Roller or Impact Mills. Automatic throw-out rejects impurities and unburned cores. Dustless operation.

CLAYS, TALC, KAOLIN

Can be reduced to any fineness from 40 mesh to micron sizes. Impurities removed by automatic throw-out.

DRY AND GRIND SIMULTANEOUSLY

Simply by introducing hot air, all sizes dry as they grind eliminating the need of separate drying equipment.



Sectional view of Roller Mill showing how material is ground between rolls and bull ring, then air swept to Separator which extracts fines and returns oversize for re-grinding.

WILLIAMS ALSO MAKES . . .

Heavy-duty hammermills for all quarry operations; impact and roller mills for 200 to 325 mesh grinding; drier mills; air separators; vibrating screens; steel bins; complete "packaged" crushing and grinding plants.

WILLIAMS PATENT CRUSHER & PULVERIZER CO.
800 ST. LOUIS AVENUE ST. LOUIS 6, MO.

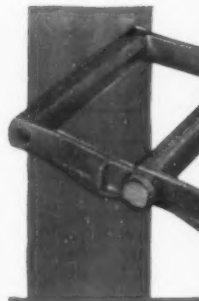
WILLIAMS

CRUSHERS

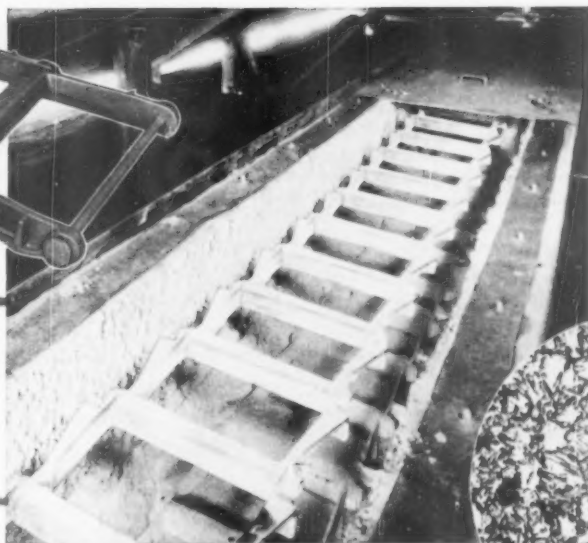
GRINDERS

SHREDDERS

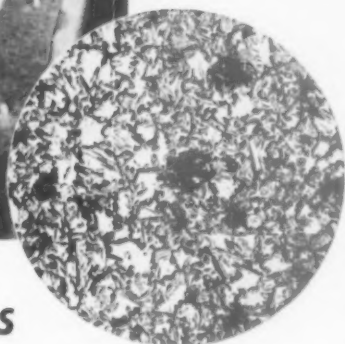




Horizontal drag conveyor, employing a single strand of Link-Belt class H-480 chain, of PROMAL, operating 50 ft. per minute, handles 150 tons of ground limestone per hour.



The photo-micrograph below (100 times actual size), clearly shows the tough network structure which gives PROMAL its great strength and resistance to wear.



IT'S **WEAR** THAT MAKES

THE MONEY GO

LINK-BELT PROMAL CHAINS *Resist Wear Longer*

Strength, toughness and resistance to abrasion are characteristics of PROMAL, the stronger, longer wearing metal, that make it especially useful in chains and buckets. Where severe service conditions are to be met, PROMAL is the preferred metal. It may be repeatedly heated and cooled without damage or growth and may therefore be used in moderately high temperature applications.

PROMAL, an original Link-Belt development, has a uniform structure throughout its cross section, and its resistance to wear and abrasion continues after the surface is worn off. This resistance to wear is due to its own peculiar structure, and not to its Brinell hardness.

LINK-BELT COMPANY

Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 3,
San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Johannesburg.
Offices, Factory Branch Stores and Distributors in Principal Cities.

LINK-BELT

Chains and Sprockets



Class C combination chain is available with cast center links of PROMAL, and side bars of high carbon steel.



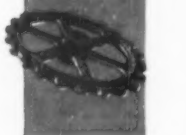
Class GL and MR roller chains, with cast or steel rollers, are primarily used for conveyors or inclined elevators where load is carried directly by the chain and where reduced chain pull is desirable.



Class 800 Lry bushed chain, of PROMAL, for heavy-duty service in presence of abrasive material.



Style AA bucket of PROMAL with heavy reinforced front edge and corners which increase the life of the bucket in handling abrasive materials.



Link-Belt "Flint-Rim" cast sprockets resist abrasion and outlast gray iron several times. Cast steel sprockets are also furnished where service is extra severe.



ROCK PRODUCTS



NOVEMBER, 1950

THE INDUSTRY'S RECOGNIZED AUTHORITY

VOL. 53, No. 11

Bror Nordberg
Editor

Nathan C. Rockwood
Editorial Consultant

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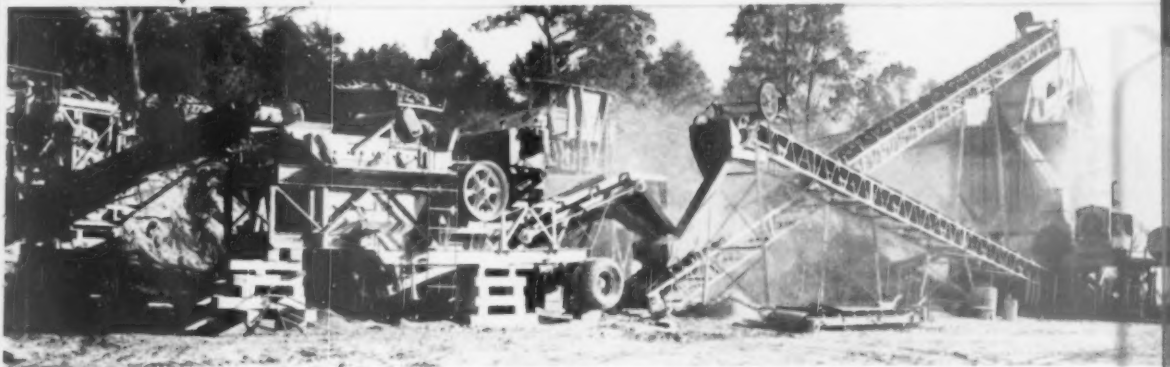
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"Our 'Cat' Engines seldom give us any trouble . . . for that reason we will use nothing else if we can help it."

They standardized ↓ on trouble-saving



WATERS ROCK AND GRAVEL PLANT (near Elizabethtown, Ky.) has 6 "Cat" Engines powering crushers; a "Cat" Diesel Electric Set for lights, screens and conveyors; 2 "Cat" Engines driving compressors; a "Cat" Engine in a shovel; a "Caterpillar" track-type Tractor.

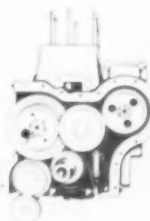
THE above statement came from H. L. Waters, partner in the Waters Construction Company (Elizabethtown, Ky.) which owns 11 "Caterpillar" Diesels. "These engines," he added, "operate in a cloud of dust all the time. But they stand up!"

Yes, there's little work for a power "trouble shooter" where "Cat" Diesels drive the whole works . . . for there's little need for tinkering, no need for studying assorted makes or types of units, and no need for scrambling all over the map when you need replacement parts or other dealer service.

Standardizing on "Caterpillar" equipment (earth-moving as well as engines) doubles up on two very desirable money-making and money-saving factors: You get equipment tens of thousands of owners regard as the toughest, most dependable and longest lasting of its kind. And you get the support of a factory-and-dealer service organization that is without equal for facilities, completeness and convenience. See your "Caterpillar" dealer for the whole story.

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

LOOK UNDER THE HIDE



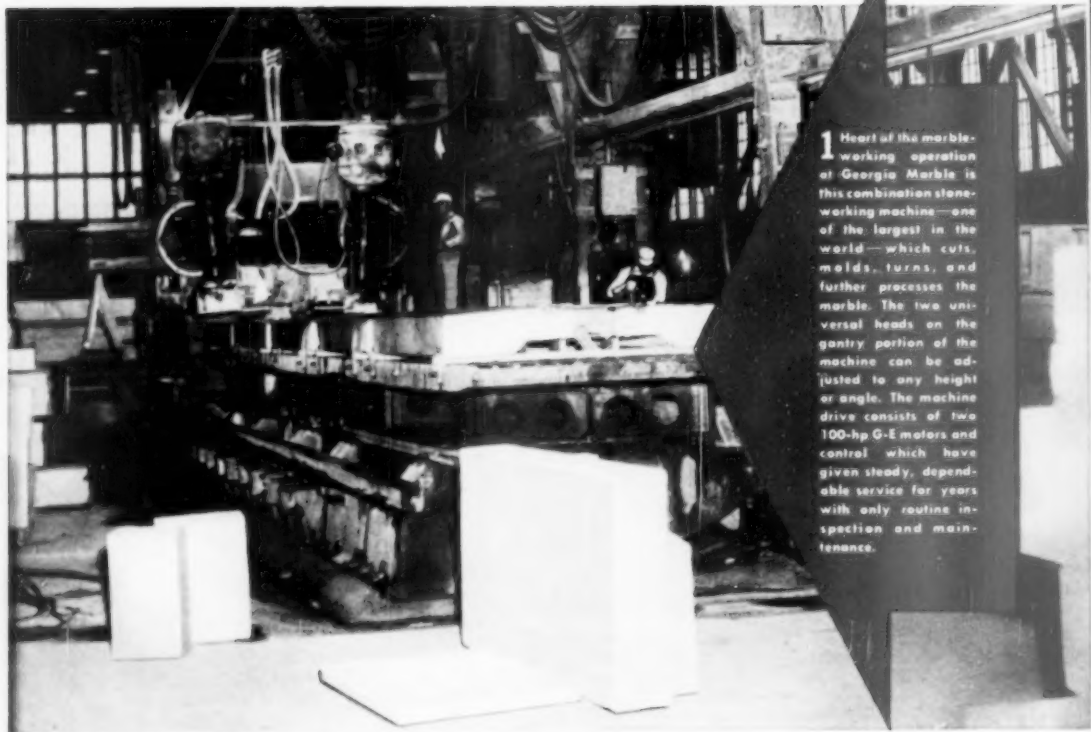
Pressure-lubricated "Caterpillar" timing gears are of wide-faced, helical design. Select steels and heat treatment methods are carefully matched to the type of service expected. Timing gears are upset forged . . . turned, shaped and shaved to average within 50-millionths of an inch of true surface smoothness. Look under the hide for "Caterpillar" quality. You'll find it in every detail.

CATERPILLAR

REG. U. S. PAT. OFF.

DIESEL ENGINES • TRACTORS

MOTOR GRADERS • EARTHMOVING EQUIPMENT



1 Heart of the marble-working operation at Georgia Marble is this combination stone-working machine—one of the largest in the world—which cuts, molds, turns, and further processes the marble. The two universal heads on the gantry portion of the machine can be adjusted to any height or angle. The machine drive consists of two 100-hp G-E motors and control which have given steady, dependable service for years with only routine inspection and maintenance.



2 At the quarry, where blocks of marble are hoisted onto flat cars for shipment to the plant, this 50-hp, G-E Tri-Clad[®] motor, with its G-E control shown at left, powers the 20-ton quarry hoist. Tri-Clad motors are noted for their built-in 3-way extra protection against physical damage, electrical breakdown, and operating wear.

[®]Reg. Trade mark of General Electric Co.



3 This 65-ton G-E diesel-electric switching locomotive, shown hauling marble blocks to the plant over the company's 14 miles of rail road, has been in service since April 1946. According to T. J. Durrett, Jr., vice-president, "it has provided excellent service, considerable saving in track maintenance, and substantial fuel economies."



4 After going through gang saws operated by a 40-hp G-E motor, the marble slabs are smoothed down on two rubbing beds (one shown), both powered by the 60-hp G-E motor in upper left. The plant's G-E motors and control have helped maintain a high degree of production continuity.

You can put your confidence in—

GENERAL  ELECTRIC

158-4

ELECTRIFICATION WITH G-E DRIVES BOOSTS PLANT'S OUTPUT!



5. Providing stabilization of voltage at Georgia Marble Co. plant is this G-E 3000 KVA synchronous condenser which improves power factor throughout varying load conditions inherent in rock products industry. Another method for improving plant power factor is the use of efficient, trouble-free synchronous motor drives where applicable.

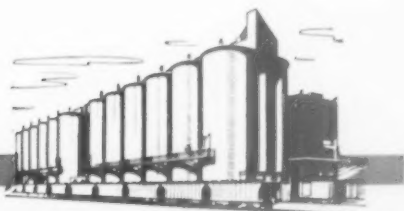
*Everything you need
to cut rock product costs
... electrically!*

G-E motors and control, plus G-E diesel-electric switching locomotive, increase efficiency and savings at Georgia Marble Company

In marble-working—as in all rock product industries—electrification pays off handsomely when you use General Electric equipment. Take it from T. J. Durrett, Jr., vice-president of the Georgia Marble Co., of Tate, Georgia, who says:

"Electrification in our plant over the years has considerably improved operations, helping to raise production and reduce costs. In this respect our G-E equipment, in particular, has more than justified its cost."

Here's the point: Whatever you get from General Electric, whether a drive for one process or all your plant's electric equipment, it's coordinated into a smooth-working installation by a G-E industry engineer. Call him in early and see how his advice can help you speed output, cut costs. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*



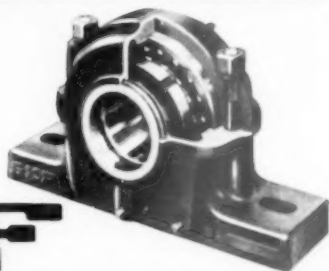
THIS PUMP THRIVES ON "ROUGHAGE"



... bearings engineered by SKF

Use of a special abrasion-resistant, nickel-chromium white cast iron gives "Durable" Dredge Pumps the rugged resistance to wear that sand and gravel pit services demand. Made by Thomas Foundries, Inc., Birmingham, they have 10-inch suction and 8-inch discharge, take flinty gravel and large rocks in their stride. They are equipped with two **SKF** Type SAF Spherical Roller Bearing Pillow Blocks ... a wise choice.

Why? Because in the Type SAF Pillow Blocks both bearings and housings are engineered and built by **SKF**. They keep friction at a minimum, keep operation economical. They are efficiently sealed to retain lubricant and keep out dust and abrasive elements. **SKF** supplies five basic types of Pillow Blocks for shafts from 1/2 inch to over 9 inches. Put one or more types to work for you at a profit. **SKF INDUSTRIES, INC., PHILADELPHIA 32, PENNSYLVANIA**—the *Pioneers of the Deep Groove Ball Bearing, Spherical Roller Bearing, Self-Aligning Ball Bearing.*



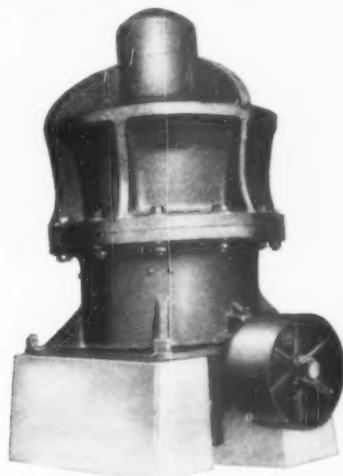
SKF
BALL AND ROLLER BEARINGS



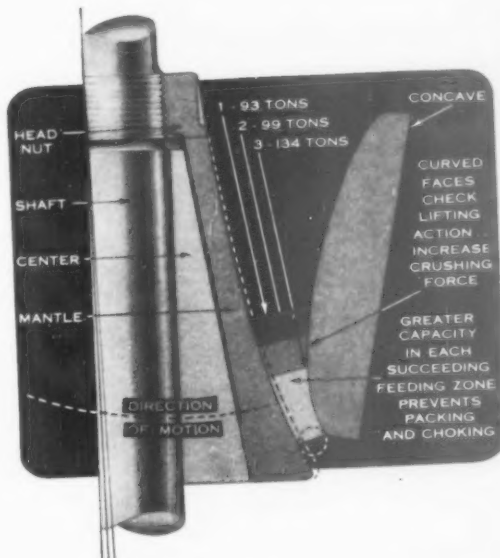
Efficient from feed to finish . . .

TRAYLOR TY Reduction Crushers

All Traylor TY Reduction Crushers are equipped with the non-chokable, self-tightening bell head and curved concaves shown in cross section at the right. From top to bottom . . . feed to finish . . . their efficiency is evident. Their top angle will nip larger rock than other secondary fine crushers. The control zone is located about midway through the crusher and has the smallest volume. Each succeeding zone has greater capacity than the one before it. The discharge zone is largest of all. This eliminates choking and packing as the material progresses through the crusher . . . assures exceptional capacity and continuous production. Even in the hardest service, the original shape of Traylor bell heads and curved concaves is fully retained until the metal is slowly worn to wafer thinness.



A positive, automatic, force feed lubrication system . . . safeguarded by the exclusive Traylor dust seal . . . further conserves power and reduces maintenance. Compactly designed Traylor TY Reduction Crushers are made in six sizes, filling most secondary fine crushing needs.



Tables showing the wide range of capacity of all six sizes are contained in Bulletin 4112 which fully describes all of the other features of Traylor TY Crushers. Write for your copy today.

Traylor

Rotary Kilns, Coolers and Dryers
Grinding Mills • Crushing Rolls
Jaw, Reduction and Gyratory Crushers

TRAYLOR ENGINEERING & MANUFACTURING CO.
206 Mill St., Allentown, Pa.

Sales Offices: New York, N. Y., Chicago, Ill., Los Angeles, Calif.
Canadian Mfrs. Canadian Vickers, Ltd., Montreal, P. Q.

A "TRAYLOR" LEADS TO GREATER PROFITS



“International Diesels have **POWER** and **ENDURANCE!**”

... says Dave Sholseth, superintendent of Strong & McDonald's rock crusher near Monse, Washington. He knows from experience that the dependable Internationals can always be counted on to deliver thousands of work-hours without trouble.

The Strong & McDonald plant gets its power from two International UD-24 Diesels, one on a crusher, the other driving a generator, plus an International UD-18 Diesel and an International UD-14A Diesel driving crushers. In addition an International UD-14 is used as auxiliary power. The plant produces various sizes of crushed rock and

averages about 200 yards an hour.

Mr. Sholseth says, "We have good luck with all our Internationals. The oldest one on the job (8,000 hours of work) hasn't even had the pan removed from the crankcase as yet."

A visit to your International Industrial Power Distributor will convince you that Mr. Sholseth's story of power and endurance is not unusual. You'll see all the advanced engineering features that combine to make International Diesels the choice of diesel power everywhere. See your nearby Distributor for complete information.

INTERNATIONAL HARVESTER COMPANY • CHICAGO 1, ILLINOIS

CRAWLER TRACTORS
WHEEL TRACTORS
DIESEL ENGINES
POWER UNITS



INTERNATIONAL INDUSTRIAL POWER

TOUGH in tread **TOUGH** in body for the **TOUGHEST** jobs you have!

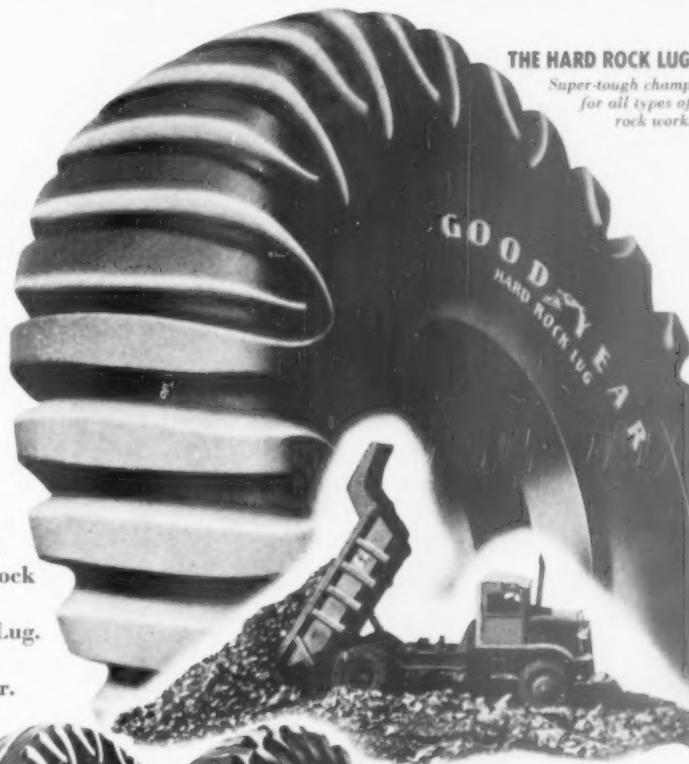
THAT'S Goodyear's Hard Rock Lug Tire. Extra-thick undertread protects its extra-tough carcass against bruising—extra-heavy tread and sidewalls are armored against cuts and rips by massive lug bars—self-cleaning tread provides outstanding traction.

With all these extras built into it, no wonder quarry operators say Goodyear's Hard Rock Lug has no equal for cutting costs on tire-killing rock work!

If you'd like to cut your rock hauling costs right down to rock bottom, ask your Goodyear dealer about the Hard Rock Lug. You'll see why it *pays* always to BUY and SPECIFY Goodyear.

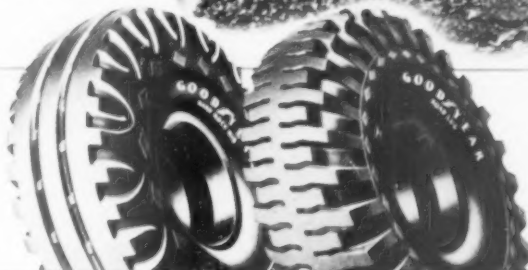
THE HARD ROCK LUG

Super-tough champ for all types of rock work.



THE HARD ROCK RIB

Companion tire for front wheels in rock work—easier steering, smooth rolling, same cord body, same shoulder and sidewall as Hard Rock Lug.



THE ROAD LUG

Remarkable dual-purpose tire operates both OFF and ON the road. Combines off-the-road toughness and traction with on-the-road mileage and economy.

Road Lug—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

We think you'll like "THE GREATEST STORY EVER TOLD"—Every Sunday—ABC Network

GOODYEAR

MORE TONS ARE HAULED ON GOODYEAR TIRES THAN ON ANY OTHER KIND

MORE-MORE-MORE



TYPICAL of dozens of installations, this Model 5050 Cedarapids Double Impeller Impact Breaker is producing tops in tonnage—and at lower cost. In a dolomite installation in Ohio, one operator claimed 720 tons per hour using two 150 H.P. Motors. In Florida, one Cedarapids Breaker is doing the work of three previous crushers in reducing a very abrasive coral rock down to minus 1". Ask your Cedarapids distributor for more field-proved facts on Double Impeller Impact Breaker action.

THE IOWA LINE of Material Handling Equipment Includes:

ROCK AND GRAVEL CRUSHERS • BELT CONVEYORS • STEEL BINS • BUCKET ELEVATORS • VIBRATOR AND REVOLVING SCREENS • UNITIZED ROCK AND GRAVEL PLANTS • FEEDERS • TRAPS • PORTABLE POWER CONVEYORS • PORTABLE STONE AND GRAVEL PLANTS • REDUCTION CRUSHERS • BATCH TYPE AND VOLUMETRIC TYPE ASPHALT PLANTS • HAMMERMILLS • DRAG SCRAPER TANKS • WASHING PLANTS • SOIL COMPACTION UNITS • STEEL TRUCKS AND TRAILERS • KUBIT IMPACT BREAKERS • DOUBLE IMPELLER IMPACT BREAKERS

PRODUCTION

of Ideal Cubical Shaped Aggregate

with **Cedarapids**

DOUBLE IMPELLER IMPACT BREAKER

(formerly made by New Holland)

Set up your plants NOW— for stepped up capacity

PUT your plant in the big money picture with the high capacity production made possible by the Cedarapids Double Impeller Impact Breaker. Think of the profit in producing greater hourly tonnage of a better product . . . and at the same time reducing your power and maintenance costs, with a lower plant investment! The illustration at the right shows how it is done . . .

Rock is broken by impact (not crushed) into the ideal cubical aggregate required in so many specifications. And a high percentage of the material is broken in mid-air by rock striking rock! Result . . . the Breaker can be fed larger rocks, handles greater volume, reduces pit run material to specification size in one pass. This extremely high ratio of reduction reduces your plant investment because it eliminates the need for much accessory equipment such as screens, conveyors, secondary crushers, etc.

Stone broken in mid-air requires no power . . . you save on horsepower. Approximately 50% less contact of stone on metal keeps replacement and maintenance costs low.

Get this big volume, low cost set-up operating in your plant now!

HERE'S the unit that will give you greater hourly tonnage capacities, better quality and shape of finished products, lower horsepower per ton of aggregate produced and a higher reduction ratio.

The Cedarapids Model 5050 Double Impeller Impact Breaker can produce up to 400 tons per hour of minus 4" clean, cubical aggregate required in so many specifications today. The smaller models—4040, 3030 and 2020 can deliver from 75 tons per hour—up, depending on the material fed, horsepower used and size product desired.

You can use the Cedarapids Double Impeller Impact Breakers for basalt, cinders, tuff, perlite, limestone, coral rock, sandstone, coal, copper ore, lead zinc ore, low grade iron ore, or dozens of other materials with a relatively low silica content. They will operate in wet, sticky material that jams, packs or clogs conventional machines.



U. S. Pat. No. 2,373,691
2,486,421
Canadian Pat. No.
439,371
Other Patents Pending

IOWA MANUFACTURING COMPANY

Cedar Rapids, Iowa, U. S. A.

Cedarapids

Built by
IOWA

NO-TURN shuttle haul...



Dumptors®

SAVE TURN TIME GAIN HAUL TIME

On every haul cycle, Koehring fast-shuttling Dumptors eliminate slow turns — at the loading unit, at the dumping point, on sharp, "zig-zag" grades. They gain more productive haul time, because Koehring constant-mesh transmission gives the same 3 fast speeds forward and reverse. Here's how much no-turn shuttle operation can increase your production:

By eliminating only 2 turns on a 1,000' haul, time studies prove that Dumptors can save 30 seconds every round trip, and increase hourly yardage output over 10% per unit. What's more — fast, easy spotting and 1-second gravity dump keep production high.

Remember, too — top hauling efficiency also means increased shovel output. For double profit protection, team fast-shuttling Dumptors with Koehring heavy-duty excavators. Four sizes: $\frac{1}{2}$ -yd., $\frac{3}{4}$ -yd., 1 $\frac{1}{2}$ -yd., and 2 $\frac{1}{2}$ -yd.

KOEHRING

COMPANY

MILWAUKEE 16, WISCONSIN

Subsidiaries: JOHNSON • PARSONS • KWIK-MIX

It will pay you to get complete facts from your Koehring distributor. Call him NOW.

IN OPEN PITS OR • UNDERGROUND



In confined underground operation, Dump-tor spots fast, close to shovel . . . no need to turn. Shovel operator has short swing cycle, a big, easy-to-hit 8' x 8' target, for loading Dump-tor over either end or side.



At dump there's no slow jockeying around. Dump-tor drives up, body forward, operator hits body release lever; gravity instantly dumps the 6-yd. payload in 1 second . . . Dump-tor heads back without turning.



On no-turn shuttle haul, from underground to surface, loaded Dump-tor leaves narrow tunnel in same position as it entered . . . travels same speeds forward and reverse . . . easily climbs 24% grades fully loaded.

JOHNSON Concentric Batchers Give You Central Cement Feed

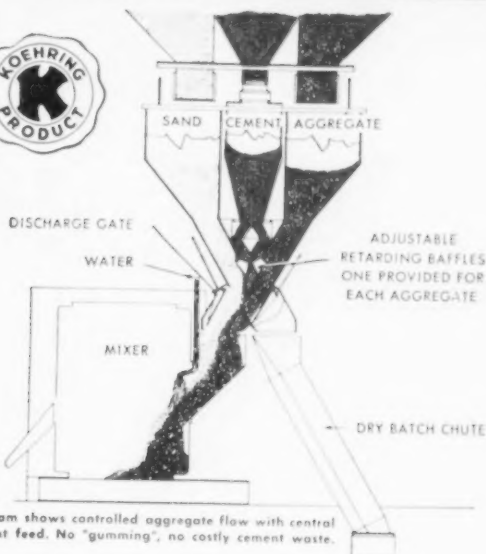


Diagram shows controlled aggregate flow with central cement feed. No "gumming", no costly cement waste.

Only with the Johnson patented Concentric Aggregate-Cement Batcher can you get all of these advantages for fast, efficient, economical operation:

1. Centralized control provides easy and fast operation.
2. Fast batcher charge and discharge reduces batch cycle time.
3. All ingredients are intermingled as they flow through discharge.
4. Materials pre-shrunk, dusting reduced.
5. "Gumming" is eliminated.
6. Cement, concrete's most expensive ingredient, is weighed on separate scale in individual centrally located cement batcher and further protected from loss by concentric arrangement of aggregates around the cement batcher discharge.
7. Adjustable rate of discharge of each aggregate from batcher gives better control of ribbon feeding.
8. Dual discharge is available . . . no separate collecting cone.
9. Extra steep slopes prevent hang-up.

Let your Johnson distributor show you how these features can increase your plant production . . . and lower costs.



Aggregates are controlled by either beam or dial accumulative scales; cement is weighed on separate scale.

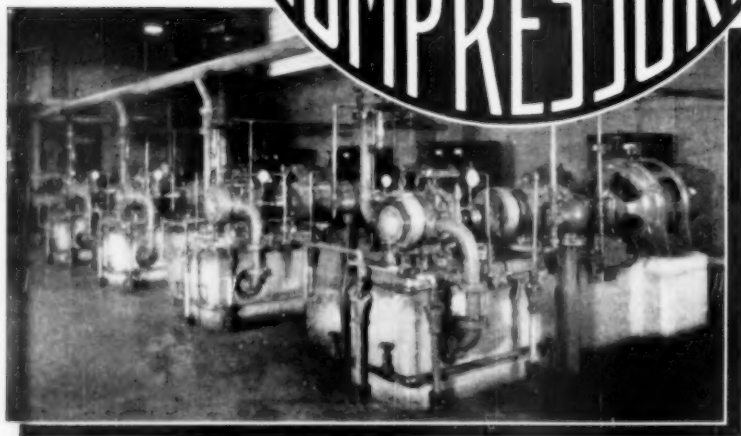
C. S. JOHNSON COMPANY
KOEHRING SUBSIDIARY • CHAMPAIGN, ILLINOIS

**CAPACITIES
TO
3300
C. F. M.**

ACTUAL
FREE-AIR
DELIVERY

FULLER ROTARY COMPRESSORS

**PRESSURES
TO
100-125
LB. GAGE**



Installation of four Fuller Rotary Two-stage Compressors.

Capacity each, 490 c.f.m., 125-lb. gage pressure.

From time to time, we meet with potential compressor customers, who, for some unknown reason, have formed the opinion that Fuller Rotary Compressors are only good for low-pressure service.

This, however, does not agree with the facts, as we are in a position to furnish, and have furnished, hundreds of machines for 100 to 125-lb. pressure, which are giving the same efficient and dependable service as units for lower pressure ranges.

The first compressors built by this company (and which are still going strong), were of the two-stage type for 100-lb. service. It was some time before we began the manufacture of single-stage machines for the lower pressures required in various industries.

Bulletin C-5, illustrates and describes Fuller Rotary Compressors and Vacuum Pumps.

We'll be glad to send you a copy. We invite your inquiries and investigation the next time you are in the market for compressors or vacuum pumps.

FULLER COMPANY
CATASAUQUA - PENNSYLVANIA

Chicago 3 - 120 So. LaSalle St.
San Francisco 4 - 420 Chancery Bldg.

C-191

A LIFETIME OF NEW MACHINE EFFICIENCY

FULLER

BEARS FOR WEAR-MISERS FOR MAINTENANCE

QUAKER CONVEYOR BELTING ... for top-notch performance at rock-bottom cost

Here's one belt that is built for the toughest materials handling job. A Quaker Conveyor Belt lifted well over one million tons of rock during an eleven year period with minimum wear!

That's because Quaker Conveyor Belts are built to tough better... resist cuts, gouges, and the effects of acid materials and mildew... withstand the shocks of loading. These belts are scientifically made of ply upon ply of strong, specially woven cotton duck tightly bonded together to prevent internal

friction while flexing. Resilient, long-lasting live rubber gives covers extra stamina. Precision controlled vulcanization moulds plies and covering into a belt that carries maximum tonnages at minimum costs.

Whether your needs are Conveyor Belting for hauling rocks, sand, gravel or aggregates... or flat transmission belts, V-belts... Quaker has a performance-proved belt that will do the job at rock bottom cost. See your Quaker distributor, or write us today for the full details.

HOSE FOR RUGGED WEAR

There's a Quaker Hose for every use in the Rock Products Industry—for suction pumps, stripping jobs, pneumatic tools, water lines, rock drills, and other types of service.



BELTING FOR MAXIMUM HORSEPOWER

V-Belts or Flat Belts, Quaker has the one to fit the drive... to transmit maximum horsepower at the lowest operating cost—all pre-tested for peak performance.



QUAKER RUBBER CORPORATION • PHILADELPHIA 24, PA.

Division of H. K. Porter Company, Inc.

OFFICES AND BRANCHES IN PRINCIPAL CITIES



FREE!

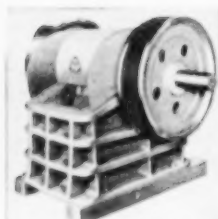
Tips on how to get the most out of Conveyor Belting!

Here's essential data for you... write today for Bulletin 62-B.

QUAKER RUBBER PRODUCTS

custom made for every industrial use





Denver Force Feed Jaw Crusher



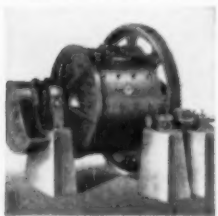
Denver Mineral Jig



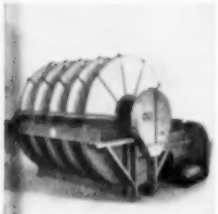
Denver Cross-Flow Classifier



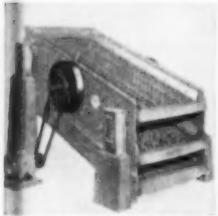
Denver "Sub-A" Flotation Cells



Denver Steel Head Ball Mill



Denver Disc Filter

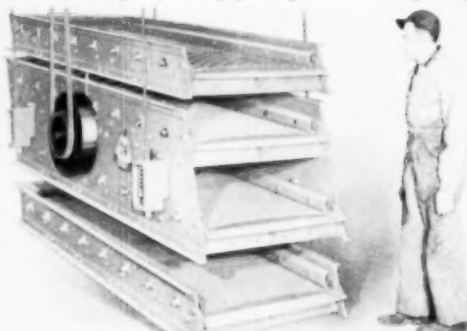


Denver Dillon Vibrating Screen, Floor Mounted Type Shown



Continuous tests can be conducted at low cost.

Use DENVER-DILLON VIBRATING SCREENS for Aggregate Sizing



Decks may be added in the field on Denver-Dillon Vibrating Screens.

Save Up to 50% HP ... due to four point suspension and only two bearing drive. Available in floor or overhead mounting. Drive from either side of machine. "A patented mechanism."

Efficient Selectivity up to 28 mesh ... because of true "floating circle" motion, entire screening surface is utilized without dampening and dead spots.

Heavy Duty Construction ... provides for 24 hour operation. Less shut down time means more profit.

Sizes up to 5' x 10' ... These field proven heavy duty screens are available in 2 x 4, 3 x 6, 4 x 8, 5 x 10, and intermediate sizes. Many sizes in stock.

Engineering and Testing Service ... Give us details of your screening and other process requirements. Recommendations will be promptly submitted. Write or wire today!



Denver Agitator and Conditioner



Denver Low Head Thickener With Denver Diaphragm Pumps



Denver Adjustable Stroke Diaphragm Pump



Denver Vertical Centrifugal Sand Pump



"The firm that makes its friends happier, healthier and wealthier"

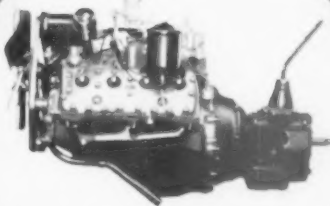
DENVER EQUIPMENT COMPANY
P. O. BOX 5268 • DENVER 17, COLORADO

DENVER • NEW YORK CITY • CHICAGO • TORONTO • VANCOUVER • MEXICO CITY • LONDON • JOHANNESBURG • RICHMOND, AUSTRALIA

PICK FORD POWER...

RIGHT 3 WAYS!

- 1 **RIGHT POWER** for your job... five great engines in the Ford Industrial Engine line. Available as complete power units or engine assemblies—both with a variety of attachments.
- 2 **RIGHT FEATURES.** Ford Industrial Engines and Power Units incorporate the newest advancements of Ford's famed progressive engineering.
- 3 **RIGHT SERVICE**—as near as your Ford Dealer, clear around the world!



Ford 239 V-8 Industrial Engine, with four-speed transmission. (Displacement—239 cu. in.)



A Ford Industrial Engine is the power plant for the Atty Force-Feed Loader, made by the Atty Products Corporation of Chicago. In such highway maintenance operations as loading scarified macadam and excess windrowed dirt, as well as piled leaf and snow removal in urban areas, this self-propelled loader has demonstrated its effective and economical operation in the hands of hundreds of operators. Where power, reliability and ease of service are important, Atty finds Ford Industrial Engines right for their product.



Ford
INDUSTRIAL ENGINES

For the right power, pick Ford! Five models from which to choose—a four with 120 cu. in. displacement... two Sixes—226 cu. in. and 254 cu. in. displacement... two V-eights—239 cu. in. and 317 cu. in. Available both as engine assemblies

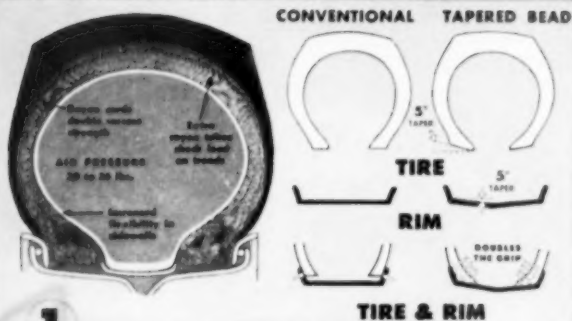
and complete power units. Completely new, and completely right for farming... construction... power generating... material handling... pumping... lumbering, many other applications. Write today for specifications.

See your nearest Ford Dealer, Ford District Sales Office, or write direct to:

INDUSTRIAL ENGINE DEPARTMENT
FORD MOTOR COMPANY
Dearborn, Michigan

YOUR JOB IS WELL-POWERED WHEN IT'S FORD-POWERED

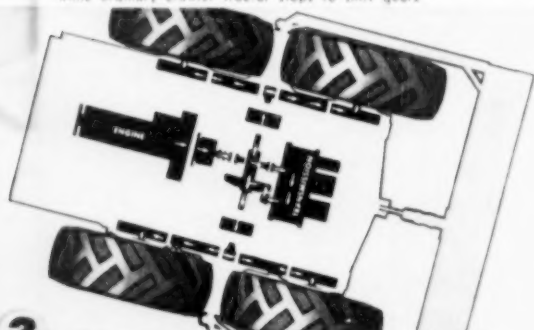
HERE'S WHY **19** m.p.h.



- 1 BIG TIRES INCREASE TRACTION**—Tournadozer's 21.00 x 25 low-pressure tires give you greater ground-gripping traction and increased flotation in sand, mud, snow or ice. Tapered bead doubles tire-to-rim grip, prevents tire slipping. Rayon cords add strength and flexibility. . . . increase tire life.



- 2 INSTANT GEAR SELECTION**—Change gear ratios instantly, automatically, with finger-tip air-valve lever. Constant power retains vital momentum. . . . keeps dirt rolling. . . . gets more work done. Tournadozer travels 100' in 3rd gear while ordinary crawler tractor stops to shift gears.



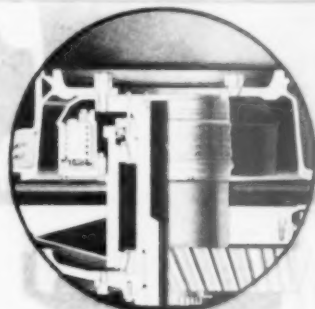
- 3 180 H.P. PUSH OR PULL**—Hangs on and moves heavy loads even in toughest going. Low compression ratio diesel engine gives more power with less fuel. 4-wheel drive provides quick pickup on level or up steep grades. Rig rolls on rubber. . . . has no tracks to grind in abrasive materials.

FIRST this job-proved dozer on rubber "runs" at 19 m.p.h., instead of crawling at 5 to 8 m.p.h. It maneuvers twice as fast—and does twice as fast as the average crawler. It gives you reverse speeds to 8 m.p.h. . . . cuts deadhead cycle time by 2.5 to 1. And, you get far more use from its greater speeds, because you have instantaneous speed selection and can change into higher gears without shifting or losing momentum.

SECOND Tournadozer has the high-speed mobility to put normal waiting periods to work. When needed on scattered odd jobs, operator just hops on this big dozer . . . and drives 19 m.p.h. cross-country or over highways. No blocking, no waiting for trailer, no loading or unloading delays. Giant 21.00 x 25 low-pressure tires prevent damage to pavement and other surfaces . . . and, in poor footing, give you plenty of traction to pull through mud, sand, or snow which would stall ordinary crawler dozers.

THIRD you can keep Tournadozer working and earning during the off-season by equipping it for sub-contracts or rentals with any of 10 auxiliary tools — including Scraper, Angledozer, Logging Winch, Side Crane, or Snow Plow. With each unit, Tournadozer's 180 h.p. engine, 4-wheel drive, and rubber-tired mobility will pay off in more work done.

Let your LeTourneau distributor give you all the facts. Call him . . . or write for new Tournadozer Bulletin TD-117 TODAY!



- 4 INSTANT BRAKING POWER**—Short-coupled 6' wheelbase and instantaneous shift give you a compact, fast-stepping unit. Heavy-duty 4-wheel air brakes, with 1305 sq. in. of braking surface on each wheel — 5220 sq. in. on all four — give you safe, sure, complete control at all times.



Send now to: **R. G. LeTOURNEAU, Inc., Peoria, Illinois**

NAME _____
 TITLE _____
 COMPANY _____
 STREET _____ CITY, STATE _____
 TYPE OF WORK _____

We may be in market for one or more Tournadozers. Please send information on ☐ 180 h.p. C Tournadozer or ☐ 122 h.p. D Tournadozer for use with:

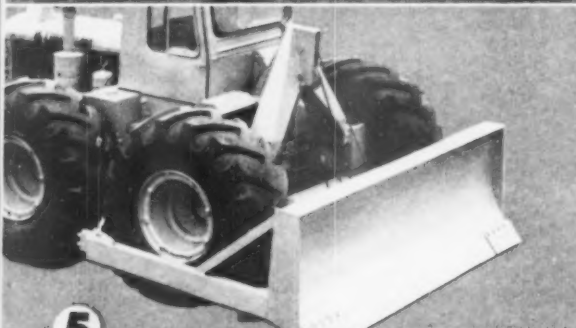
- | | |
|---|-------------------------------------|
| <input type="checkbox"/> Bulldozer | <input type="checkbox"/> Snow Plow |
| <input type="checkbox"/> Angledozer | <input type="checkbox"/> Side Crane |
| <input type="checkbox"/> Carryall Scraper | <input type="checkbox"/> Rotters |
| <input type="checkbox"/> Logging Winch | <input type="checkbox"/> Rollers |
| <input type="checkbox"/> Tree Pusher | <input type="checkbox"/> Root Rake |

TOURNADOZER *will do more work for you*



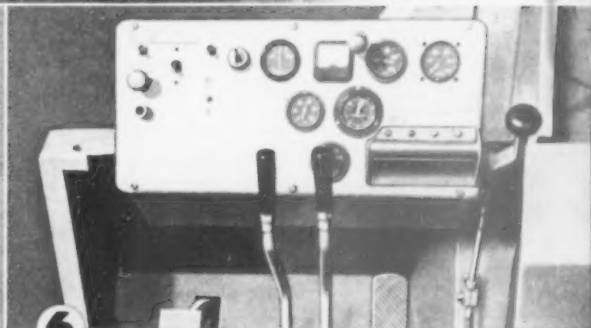
HANDLES 7 MAINTENANCE JOBS IN 10 HOURS —

At their Omas open-pit iron mine near Eveleth, Minn., E. W. Coons Co. has assigned a number of widely scattered jobs to one C Tournadozer. In a typical 10-hr. shift, the hustling rubber-tired "C" maintains 2 overburden dumps, stockpiles iron ore, cleans up around 3 large shipping chutes, and handles haul road maintenance. Compared to ordinary crawler operation, Tournadozer's work-and-run ability makes every hour productive for profits.



5

FAST ELECTRIC-CONTROL BLADE—Powerful, electric-control PCU plus smooth, accurate, short-coupled cable connection gives better blade control to match high dozing speed. 44" lift unlimited drop 5" tilt at either end 11' 2" x 3' 7" bowl fills fast, drifts big 2 1/2-yd load



6

EASY TO OPERATE—Compressed air takes the work out of Tournadozing. Simple controls are air-actuated... easy to reach. Operator sits up front ahead of engine... can see where he's going, what he's doing. No stretching, no twisting, no end-of-day fatigue slow-down

LETOURNEAU
PEORIA, ILLINOIS



TOURNADOZERS

IT'S RUBBER THAT PUTS THE ACTION IN TRACTION



Bridge of Rubber-Glass

... REPUBLIC HOT MATERIAL BELT

Materials too hot for conventional type conveyor belts now ride safely on Republic Rubber-Glass Belts.

Rubber-Glass Conveyor Belts are made with woven strands of glass fabric, imbedded in special insulating rubber. They look like, and, except for exceptional resistance to high temperatures, act like regular conveyor belts. They're tough and flexible; high in resistance to cutting and abrasion.

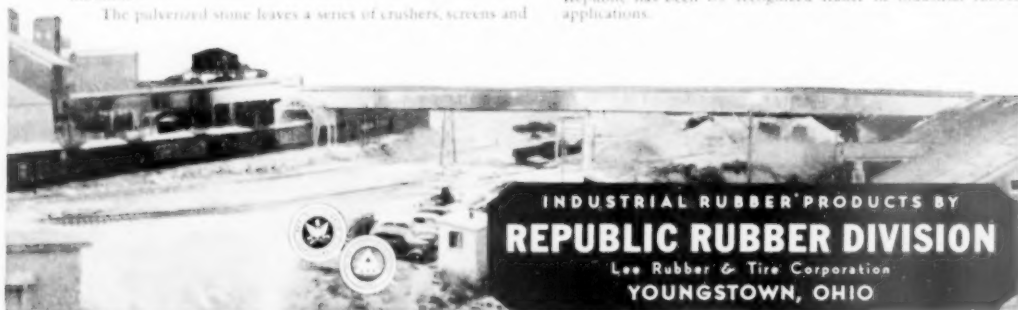
In Hillsville, Pennsylvania, the Carbon Limestone Company uses a 365-foot long endless Republic Rubber-Glass Belt to conquer heat concentrated in their product—ground agricultural limestone.

The pulverized stone leaves a series of crushers, screens and

heat drivers and drops stinging hot upon Republic's Rubber-Glass Belt. The work is continuous and although temperatures often exceed a belt-killing 500° F., up to 80 tons of material are handled during a single hour without harm to the belt.

Republic's Rubber-Glass Conveyor Belts are made for jobs like this . . . for any job where extra high temperatures are encountered. Consult your local Republic Distributor about your special requirements or write direct for information.

Remember, at Republic Rubber, your problems get individual attention at no extra charge and, for nearly a half century, Republic has been the recognized leader in industrial rubber applications.

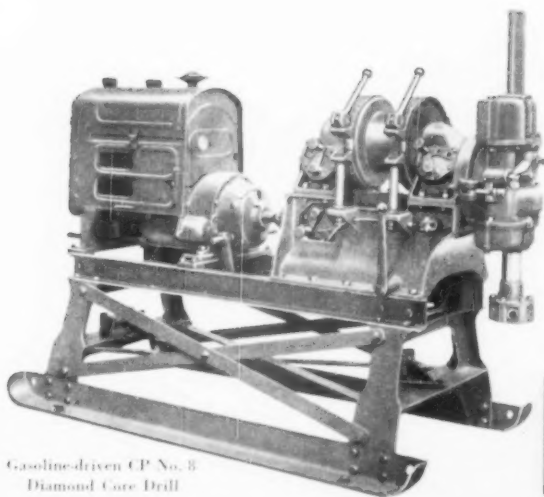


INDUSTRIAL RUBBER PRODUCTS BY

REPUBLIC RUBBER DIVISION

Lee Rubber & Tire Corporation
YOUNGSTOWN, OHIO

FOR EXPLORATORY DRILLING



Gasoline-driven CP No. 8
Diamond Core Drill

For exploring quarry sites or possible extensions of present sites, the gasoline-driven CP No. 8 DIAMOND CORE DRILL is ideal. Ruggedly built, skid mounted, readily moved from hole to hole under its own power.

Drilling at the continuous high speed made possible by hertz bits, the CP No. 8 gives exceptional performance with remarkably low maintenance. With E-EX Fittings it has a capacity of 900 feet.

For still deeper drilling, the CP No. 15 provides a capacity of 1750 feet. Both the No. 8 and No. 15 are also available with Diesel-drive.

Write for Bulletin No. 313



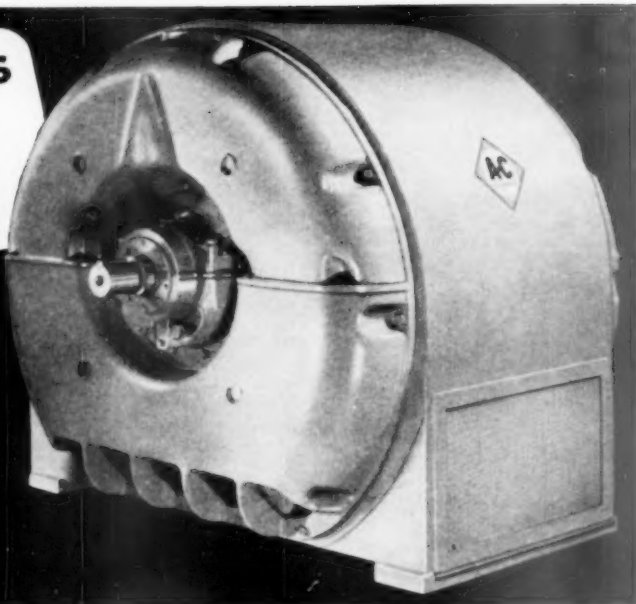
**CHICAGO PNEUMATIC
TOOL COMPANY**

General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

**ALLIS-CHALMERS
LARGE
MOTORS**

NEW



Built to Cut Maintenance

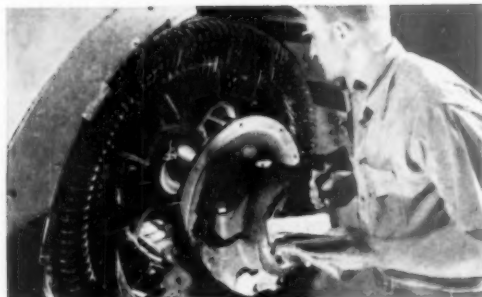
EASIER MAINTENANCE PROCEDURES and lower maintenance costs are important features of this brand new line of large motors. One man can perform all routine maintenance procedures, including opening up the motor for cleaning. Bearing surfaces are not exposed to abrasive grit and dirt during cleaning operations.

The appearance of this new line of large motors reflects the advanced design and fine workmanship that goes into their manufacture.

A well-braced, sturdy fabricated steel frame with cast-iron end brackets rigidly support and protect working parts. Ventilating openings are large to provide adequate cooling air at low velocities with resultant low sound level.

Wide Range of Sizes

These new design Allis-Chalmers drip-proof and splash-proof squirrel-cage induction motors are built in sizes from 60 hp at 300 rpm to 1500 hp at 1800 rpm. Ask your Allis-Chalmers representative to show you the details of this exceptional new motor or write for Bulletin 05R7542.



How's This for Accessibility

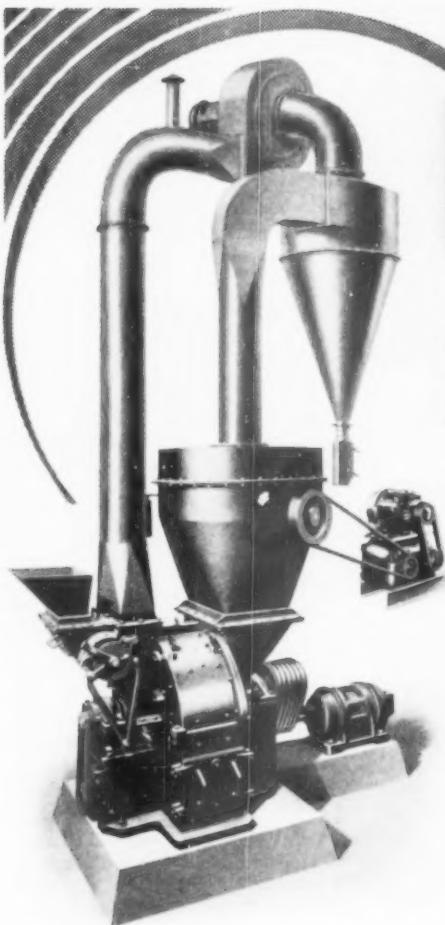
One man can remove the end brackets and air baffles and reach right inside motor with his vacuum cleaner or air hose. Bearing remains sealed against abrasive dirt throughout the cleaning operation.

Large air discharge openings with removable louvers allow plenty of room to get in with an electric drill for dowsing and bolting the motor to the base. Plenty of room to reach up back of the stator core for cleaning.

ALLIS-CHALMERS, 975A SO. 70 ST.
MILWAUKEE, WIS.

ALLIS-CHALMERS





Why...

QUALITY-MINDED PRODUCERS

specify the Raymond
WHIZZER-EQUIPPED
IMP MILL

1

FLEXIBLE INSTALLATION

2

ECONOMY OF OPERATION

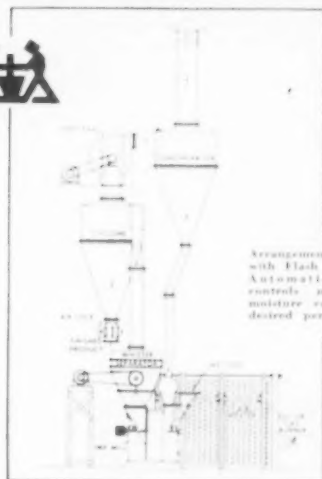
3

EASY FINENESS CONTROL

This unit has an enviable record in the softer non-metallics field for grinding, classifying, and simultaneously drying materials such as clays. Some of its many advantages are:

- Easily adjustable fineness with consistent finished products at any fineness specification
- May be equipped with Flash Drying accessories to remove surface moisture while pulverizing
- Adaptable to fit any floor plan or building layout
- Automatic handling and air conveying from feed hopper to finish bin. No separate elevators or conveyors needed.
- Ruggedly and dependably designed for economical service.

The Raymond Whizzer-Equipped Imp Mill may well be the answer to your production problem. Ask for Catalog No. 67 and tell us about your requirements in detail.



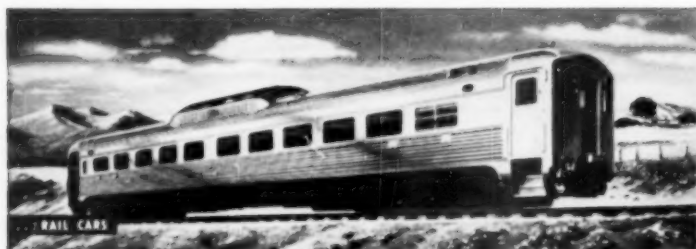
Arrangement of Imp Mill with Flash Drying Units. Automatic temperature controls maintain final moisture content at any desired percentage.

COMBUSTION ENGINEERING - SUPERHEATER, INC.

Sales Offices
in Principal Cities

Raymond
PULVERIZER DIVISION

1307 North Branch St.
Chicago 22, Illinois



This is the Diesel that speeds the big jobs



HERE IT IS—the newest member of the General Motors Diesel family—the brawny 6-110 engine that develops 275 horsepower.

It is 50% more powerful than the famous 6-cylinder GM "71" engine that powers so many trucks, buses, boats, construction equipment and other mobile, portable and stationary units.

This rugged new Diesel doesn't care what's tied to its tail. It has power to spare to keep big jobs humming, yet is so compact it doesn't hog space.

For example, each new Budd RDC rail car is driven by a pair of 6-110 Diesels with GM torque converter transmissions. The compactness of these power plants permits mounting them under the floor so that no revenue space is lost. These rail cars accelerate from standstill to 44 miles

per hour in just one minute and have a top speed of 83 mph with a full load.

Like all other GM Diesel engines the 6-110 is two-cycle—delivers power on every piston downstroke. This advanced design cuts down Diesel size without sacrificing ruggedness; it insures fuel economy, lower maintenance costs, exceptional dependability and long life.

The GM 6-110 engine provides Diesel power at its best for heavy-duty jobs—not only for rail cars but in the largest mountain-type trucks, huge rock crushers, deep-sea fishing and pleasure boats, big pumps and compressors, mining and oil field equipment. *It is an exceptionally compact Diesel for its horsepower—an engine that gives remarkably fine performance in minimum space.*

DETROIT DIESEL ENGINE DIVISION

SINGLE ENGINES... Up to 275 H. P. DETROIT 28, MICHIGAN MULTIPLE UNITS... Up to 800 H. P.
GENERAL MOTORS

Also known as TAYLOR all these every Mobile evering over the ABE Network, used to count.

*Only GM Diesels provide
all these advantages*

Compact size—less weight per horsepower • Two-cycle smoothness, power on every downstroke • Quick starting, on its own fuel • Unit injectors—no high pressure fuel lines • Rapid acceleration • Cleaner burning • Better high altitude performance • Easy accessibility.



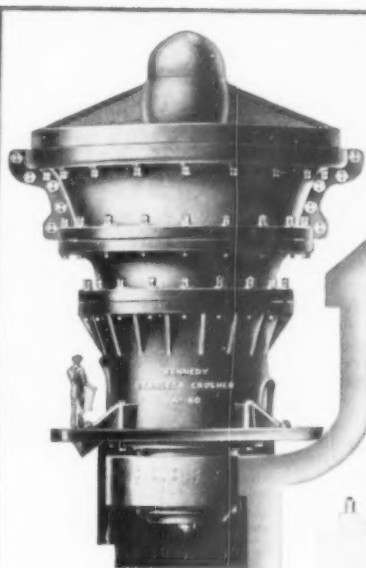
"Your Key to Power Economy"



LET'S

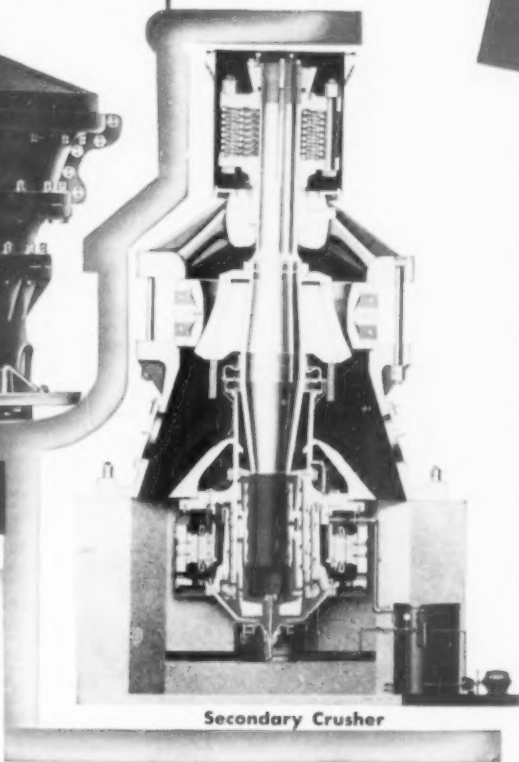
TALK ABOUT A REAL CRUSHER

It's Rugged!



Primary Crusher

**ROLLER BEARING
GEARLESS GYRATORY
CRUSHERS**



Secondary Crusher

- Synchronous motor built into pulley assembly
- Power applied **ONLY** for crushing
- Force-feed lubrication
- No gears to waste power
- Added power at no added cost
- Quiet — smooth Frictionless action
- Varying capacities to serve every purpose

Designed and built to produce, economically and consistently, maximum loads of uniform products. Assures efficient service with minimum "time off for repairs" under the most severe operating conditions.

Costs less in the long run because it has a larger capacity; uses less power; holds repair bills to a

minimum; produces more and better rock tonnage, faster and at lower cost.

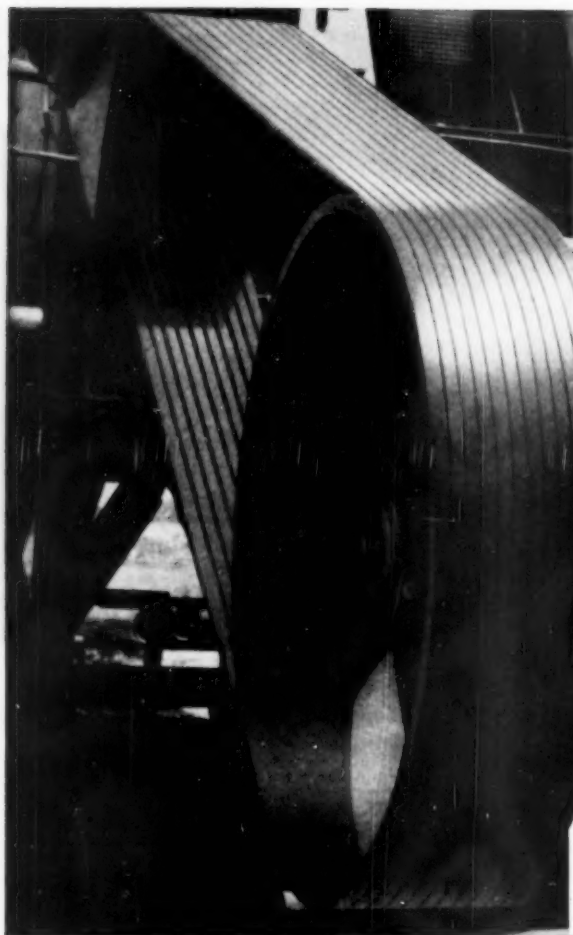
Kennedy Crushers are made in various size units delivering from 12 to 3600 tons per hour. Engineered to serve your exact needs. Fifty years experience in the building of heavy duty crushers is your assurance that "It Costs Less To Own The Best" when you use KVS equipment.

Send for bulletins describing, fully, all types of KVS crushers

KENNEDY-VAN SAUN MFG. & ENG. CORPORATION

TWO PARK AVENUE, NEW YORK 16, N. Y. FACTORY: DANVILLE, PA.

WE CALL THEM "BULL DOGS" —you'll call them "WORKHORSES"



... these Tough Longer-Lasting V-Belts

TODAY with production at peak levels it pays to put your money on the right horse—a V-Belt that's a real "workhorse"! Dependable Bull Dog V-Belts have the built-in stamina that assures longer, no downtime operation that keeps production up and maintenance costs down.

And here are 4 reasons why Bull Dog V-Belts give you more for your belt money in trouble-free service, less slippage and savings through longer life:

1. Specially Engineered BWH Cord Section has high tensile strength. Result: superior load carrying capacity and ability to absorb shock loads.
2. Minimum Stretch — due to a new and exclusive technique in processing Bull Dog Cords. Result: less slippage, fewer adjustments, extended life of the belt.
3. Durable Covers — closely woven, heavy, bias-cut fabric takes the severe wearing action where the belt contacts the sheave and seals the belt against the penetration of dirt, grease, moisture.
4. Takes Punishing Flexing — BWH technologists with a 72-year background of leadership in mechanical rubber products have developed quality-controlled compounds which run cooler and do not crack or deteriorate under severe flexing.

If you're using Bull Dog V-Belts now — more power to you. If not, it will pay you to switch — ask your BWH distributor.

TOUGH PROBLEMS INVITED — Don't hesitate to ask us or your nearest BWH distributor about your power transmission belting, conveyor belting and hose problems. We're specialists in making mechanical rubber products work better, longer.



Another Quality Product of

BOSTON WOVEN HOSE & RUBBER COMPANY

Distributors in all Principal Cities

PLANT: CAMBRIDGE, MASS. • P. O. BOX 1071, BOSTON 3, MASS., U. S. A.



Why dig deep to pay hauling costs?

DODGE

trucks are
"Job-Rated" to cut costs!

"Job-Rated" ... for low-cost transportation

POWER: ... 8 great truck engines—each "Job-Rated" for PLUS power.

ECONOMY: ... priced with the lowest "Job-Rated" for dependability and long life.

BIGGER PAYLOADS: ... carry more without overloading axles or springs because of "Job-Rated" WEIGHT DISTRIBUTION.

EASIER HANDLING: ... sharper turning! Parks in tight places. "Job-Rated" maneuverability!

COMFORT: ... widest seats ... windshield with best vision of any popular truck. Air-cushioned, adjustable "chair-height" seats.

SAFETY: ... finest truck brakes in the industry ... hand brake operating independently on propeller shaft on oil models—12-ton and up.

Yes, you can cut your hauling costs plenty with trucks that fit your job—Dodge "Job-Rated" trucks!

Your Dodge trucks will have engines that are "Job-Rated" to give you power to spare with top-notch economy. You'll save on gas, oil—and upkeep, too!

And remember, "It's a long haul between overhauls with Dodge 'Job-Rated' trucks!" You'll enjoy their long life of dependable performance on your toughest pit or quarry jobs.

Take a look at the other Dodge truck advantages listed below. Then ... for a good deal ... see your Dodge dealer today!



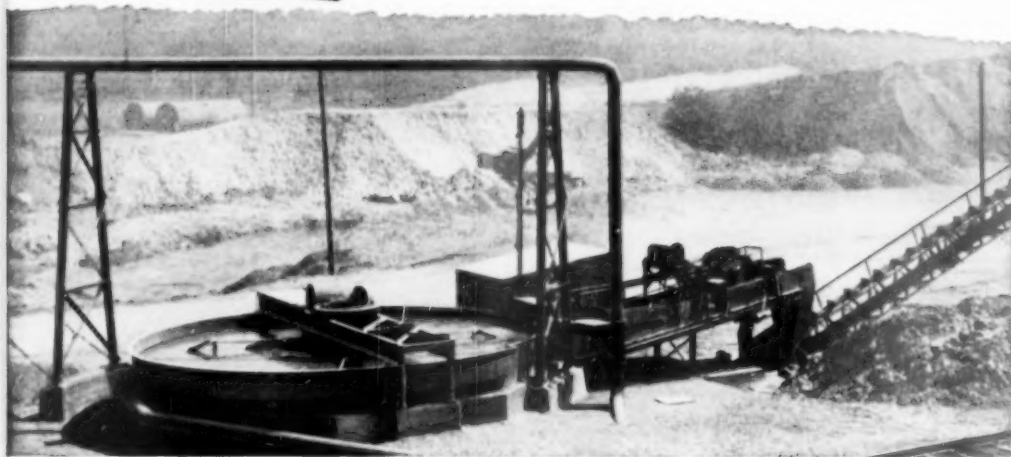
With all their extra value **DODGE "Job-Rated" TRUCKS** are priced with the lowest

for ***Low cost*** fine solids recovery...

the
**DORRCO
BOWL
DESILTOR**

Here's an economical

method for recovering fine solids—such as sand and agstone—from large quantities of water. The Dorrco Bowl Desiltor, a low cost modification of the Dorr Bowl Classifier, gives you just what you need for such operations... big settling area and relatively small raking capacity. Rotating rakes in the bowl plow settled solids outward to a hopper which discharges into the classifier section... clarified effluent overflows a peripheral launder on the bowl. Below are some operating data from a recent Bowl Desiltor installation.



The DORRCO BOWL DESILTOR in operation

Pictured above is a Bowl Desiltor recovering saleable agstone from a stone washing operation at G. & W. H. Corson, Inc. near Philadelphia, Pennsylvania. The bowl is 26 ft. in dia. and the Classifier is a duplex model with 5 ft. wide by 30 ft. 4 in. long rakes. Feed averages 600 gpm containing 3-4% solids of which 95% is minus 100 mesh material and approximately 50% is minus 325 mesh. 88% of the plus 325 mesh material is recovered as a rake product containing 25% moisture. Average overall recovery is 55 to 60% amounting to 3 to 4 tons per hour.

If you have a washing operation and these results sound interesting, a Dorr engineer will gladly supply more information on the Bowl Desiltor.



THE DORR COMPANY, ENGINEERS
BARRY PLACE, STAMFORD, CONN.

NEW YORK • ATLANTA • TORONTO
CHICAGO • DENVER • LOS ANGELES
RESEARCH AND TESTING LABORATORIES
WESTPORT, CONN.

SUGAR PROCESSING
PETREE & DORR DIVISION, STAMFORD, CONN.
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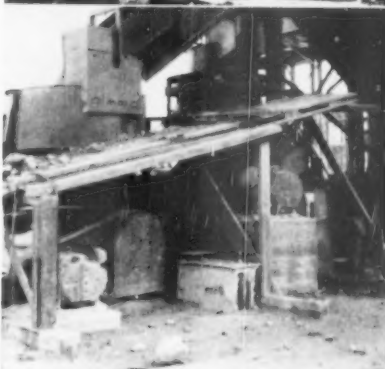
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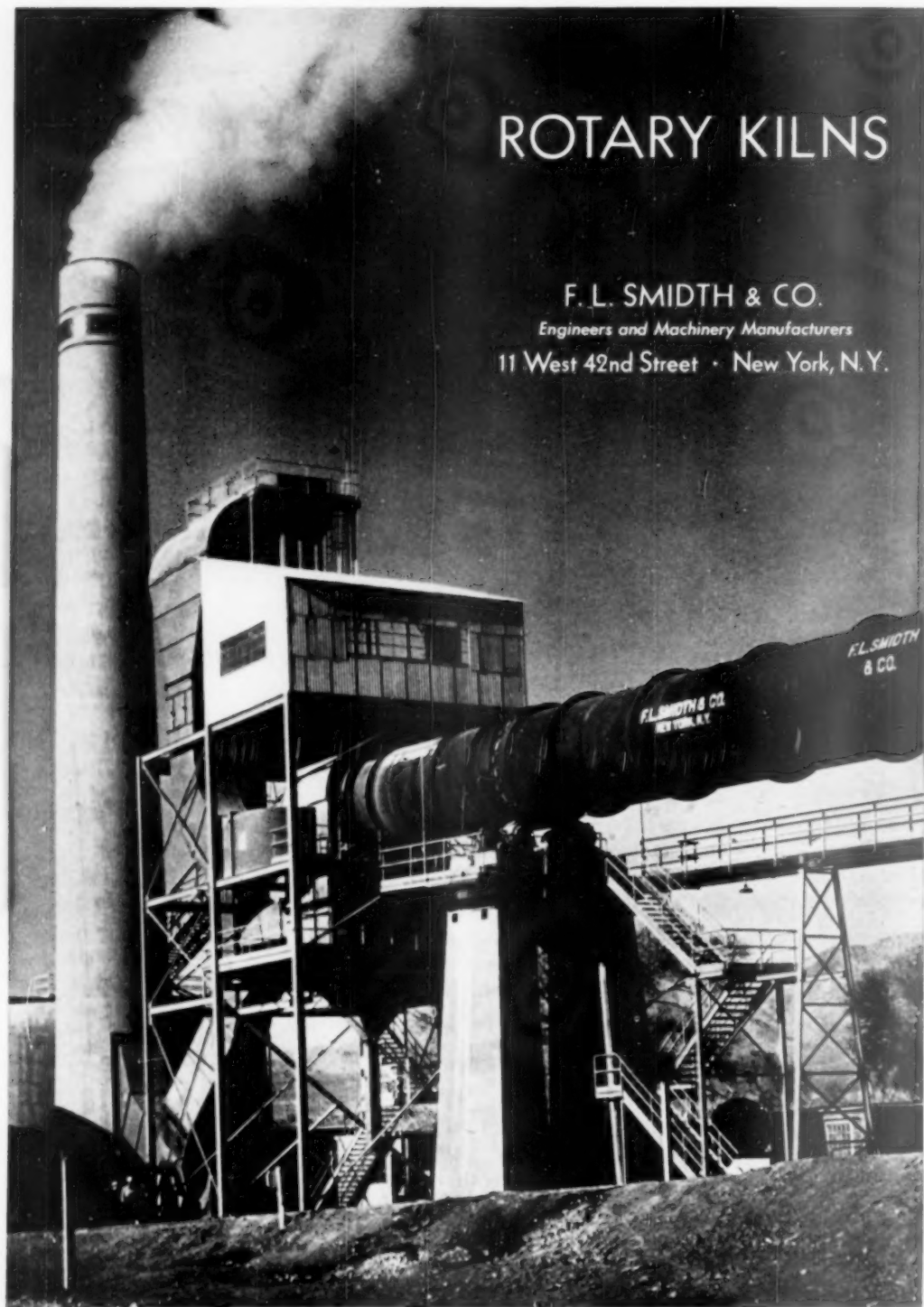
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"WE HEAR..."

November, 1950

Excavating and earthmoving equipment moved into the field to the tune of \$150,000,000 in the second quarter of 1950. This is the highest rate of construction machinery shipments on record. It is 24 percent above first quarter shipments and almost 37 percent above the 1949 average. But it is only 15 percent above average shipments for 1948, which were at the previous record-breaking rate. Shipments of road construction and maintenance machinery show the largest increase.

* * * * *

The measured backlog of proposed engineering construction in the United States reached \$49,939,756,000 by the end of August. This is up \$2,673,355,000 since the first of the year, Engineering News-Record reports.

* * * * *

Madison County, Tenn., has started construction of a bridge deck that applies prestressing principles about which, until now, there had been only speculation in this country. The prestressed deck will be made up of 8-in. precast concrete block with bottoms cast to accommodate prestressing wires.

* * * * *

A free site, tax concessions and fixed property valuation are inducements offered at St. John, New Brunswick, to any commercial group that will establish a cement mill there. An "intolerable" cement-supply condition in the area has prompted the offer.

* * * * *

Reinforced concrete ties are to replace wooden ones on all Mexican railroads, the National Railways of Mexico has announced. This is expected to help conserve lumber reserves, and at the same time help develop the national cement industry. Experts in the fabrication of concrete ties are to be invited to Mexico shortly.

* * * * *

Despite a pessimistic outlook for housing starts for next year, starts this year still are running high. August starts were 141,000, only 2.1 percent below July starts, as announced by the Bureau of Labor Statistics. The figure for May has been revised upwards to 149,100 from 140,000 to set an all-time high. The 8-month total of starts for 1950 is 988,400, 54 percent above starts for the same period in 1949, when the total was 644,100.

* * * * *

A comparison of railroad financial results for the first six months of 1950, compared with the same period of 1941, discloses that total operating revenues in 1950 were 74.2 percent higher than in 1941, while operating expenses in 1950 were 100 percent higher than in 1941. Net railway operating income, after federal income taxes, was 20 percent lower than in 1941. Net income, after all charges, in 1950 was 21.25 percent higher than in 1941.

* * * * *

Plants with portable gasoline engine driven arc welders of ample capacity should not overlook extra profits available from thawing frozen water pipes this winter. One or two operators are said to easily handle 15 to 25 thawing jobs per day at a fixed price for service thawed. Local City Water Departments, Public Utility Companies, etc., should be notified by those having pipe thawing equipment available for immediate call.

WE HEAR

A gravel pit owned by the city of Ashtabula, Ohio, has run out, and the city wants to buy another. However the local teamsters union objects, preferring that the city buy gravel from suppliers, whose trucks are driven by union members. Union members see no point in paying taxes for something that will take work from them. Ashtabula will buy 5000 tons from suppliers to get relative cost figures on commercial vs. city-owned gravel. If city-owned gravel is no more costly than commercial gravel it is possible that the city will buy the new pit--and haul with city-owned trucks.

Success with highway ice and dust control field trials and increased shortages of conventional forms of calcium chloride have prompted the Dow Chemical Co. to step up production of Peladow calcium chloride 94-96 percent at the company's Ludington, Mich., plant. Offered in limited quantities for the past two seasons, the high-test anhydrous pellets now are being priced competitively f.o.b. Ludington with Dowflake, the company's established calcium chloride product. High analysis of the pellets will generally save customers approximately one-fifth in freight, packing and handling costs over conventional types of calcium chloride, the company states.

The steel industry has announced plans to expand its annual capacity to a total of 109,963,000 net tons by the end of 1952. This represents an increase of 9,400,000 net tons over its July 1, 1950 capacity of 100,563,000 net tons.

An assortment of large bones found during excavation at the Hugo Sand & Gravel Co., near Kent, Ohio, may prove giant prehistoric animals roamed that area during the days of cavemen. The bones were turned over to a biology professor who reported them to be larger than the bones of any present-day domestic animals. However, he preferred to examine the strata of the earth where the bones were found before determining whether they belonged to a prehistoric giant, or whether an oversized draft horse may have been buried in the pit.

Washington's latest prediction on housing is even more pessimistic than earlier ones. It estimates that housing starts next year probably won't exceed 800,000. Estimates as low as 700,000 are being mentioned by builders themselves.

The number of unemployed in the United States dropped in September to the lowest level in 21 months, the government has reported. At the same time, employment fell off by more than 1,100,000 from August's peak, largely because of a seasonal slowdown in farming and the return to school of thousands of summer workers. It was estimated that there were 2,341,000 jobless in September, 159,000 fewer than in August and only about half as many as were idle at the beginning of 1950. There were 61,226,000 persons at work in September, compared with the record August total of 62,367,000.

The practice of soil-testing is spreading in Illinois. In 1947 farmers in the state had 700,000 acres of their soil tested for acidity, available potash, and phosphorus. In 1948 that acreage rose to 1,009,000 and in 1949 to 1,262,300 acres. There are 76 laboratories in the state, serving 83 counties. These are supervised by the College of Agriculture.

Tests on concrete reinforced with wood bars tried in Hungary showed wood to be an effective reinforcing material. It also was concluded that decay of wood properly imbedded is not probable. In addition, wood-reinforced, precast concrete piles are less breakable under the hammer than many other kinds. Concrete covers to prevent decay of wood should be at least 1 1/2 times the thickness of wood. Tests showed reinforcing should be presoaked to prevent swelling of wood.

THE EDITORS

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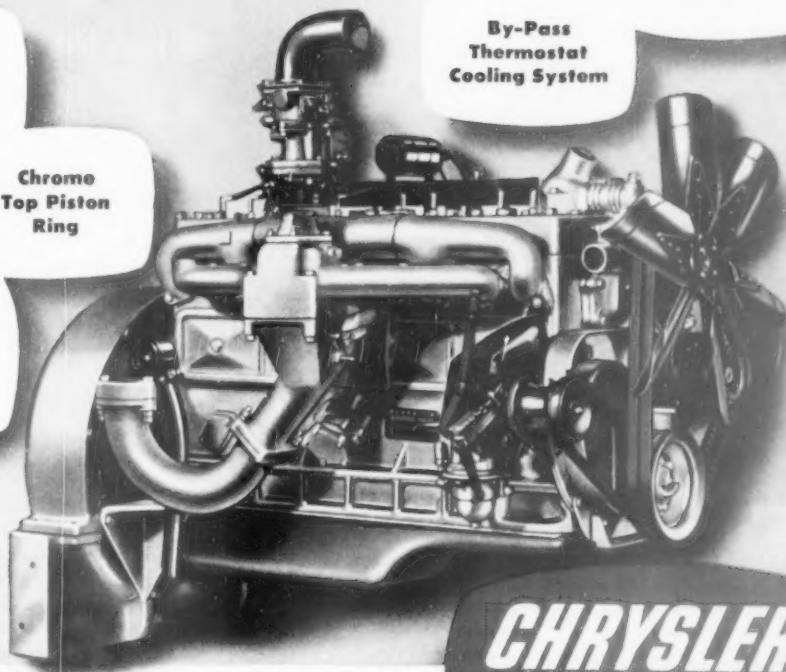
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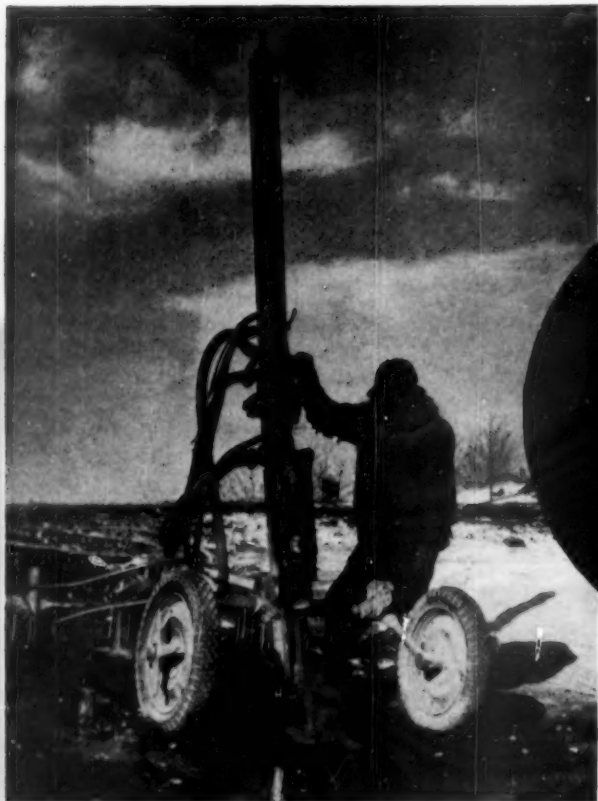
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Editor's Page

Emphasis on Service a Guarantee of Business in Buyers' Market

SHORTAGES of cement continue to be of serious proportions in their effects on the construction industry, and the reasons given for the short supply are now fairly well accepted as reasonable by buyers of cement. However, those customers who have had to curtail their activities and forego business for lack of cement are not too happy about the situation and some of them are becoming critical of their relationships with portland cement manufacturers.

In recent gatherings of ready-mixed concrete producers, instances have been brought out, in off-the-record discussion outside scheduled meetings, where manufacturers of cement have taken advantage of a situation and have, in effect, needlessly gone out of their way to antagonize customers of long standing.

One of the nation's largest ready-mixed concrete producers has claimed that he has experienced extremely shabby treatment from his regular suppliers of cement and that he no longer enjoys any of the normal courtesies that ordinarily exist in the seller-buyer relationship. His company happens to be a very large consumer of cement and one that has always been in the forefront in furthering the interests of quality concrete. In a second case, a producer on the eastern seaboard has claimed that a domestic manufacturer of cement has threatened to withhold cement from him in the future if he purchases imported cement now being made available to him.

These complaints are by no means universal, nor do they reflect on the entire portland cement industry but, like in any industry, the mistakes made by representatives of a few individual companies gain wide publicity by word of mouth and are sometimes given unjustified interpretation.

Role of Ready Mix

Certainly, it is not the intent of portland cement manufacturers as an industry to jeopardize its standing with a customer industry that is probably the largest single normal buyer of cement and which represents a steady outlet for the future. Rather, the two industries have worked together to promote the sale of high quality concrete and it is recognized that ready-mixed concrete producers have made notable contribution to the effective and economical use of concrete.

From the standpoint of the portland cement industry, it is an important fact that some thirty-five million barrels of cement are now required annually for ready-mixed concrete. Ready-mixed concrete affords a steadier and more uniform de-

mand than any other user and, as a result of its availability, the use of cement per dollar of construction outlay has been increased. It is also recognized that that industry has had much to do with prolonging the construction season to the benefit of the cement industry, contractors and the ultimate users of concrete structures.

It is unfortunate that a small minority in nearly all prosperous industries forget that a buyers' market will some day enter the picture. They fail to recognize that their ways of doing business today will be remembered in times when the buyer again can become choosy in purchasing from more than one source.

Shifts in Markets

It may be that the international situation and the resulting drastic curbs on certain classes of civilian construction which will surely come will result in a changed situation within the next year. The president has already ordered reduction of federal spending by curtailing public works. Civilian public works programs are being screened with a view to deferment, curtailment or slowing down of projects if they do not directly contribute to national defense or essential civilian requirements. Furthermore, cement has been declared a critical material for the first time in history and government agencies have been ordered to curtail purchases of cement.

The result can well be a shifting of greater emphasis to relatively small quantity purchasers, of which the ready-mixed concrete industry is most important, and which industry will play large part in permissible defense construction. Then, or sooner or later, we will have the return to conditions under which concrete producers may resume their normal practice of stocking several brands of cement. Cement being a standard commodity, the brands that will be selected will come from suppliers who have given best service.

The safest bet in competitive merchandising of a standardized commodity is to emphasize service and to do it as a continuing policy regardless of whether a sellers' or a buyers' market exists or whether change from one of these market conditions to the other may develop. The customer is entitled to service and the wide-awake seller today is emphasizing service to each customer.

Bior Nordberg

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Rocky's NOTES

Nathan C. Rockwood

How Union Members Dilute Their Freedoms

THINKING AMERICAN CITIZENS are alarmed at the scant attention paid to the Constitution of the United States. Apparently present-day school histories do not include it, most school children have never read it, and the fashion of the times, since 1933, has been to regard it as old-fashioned, even obsolete. Yet the older generation who did study histories that included the Constitution and how it was achieved, know that without it we would long ago have lost the last vestige of individual freedom.

Not many, however, realize that some 15,000,000 present-day Americans have actually signed away their birthright, in most instances voluntarily and probably unwittingly. These are members of many national and international labor unions, a great majority of whom apparently are as unfamiliar with the contents of their own union constitutions and by-laws as they are with the United States Constitution and Bill of Rights amendments.

No enlightened person now argues that labor unions also have not been of immense help in maintaining the freedoms the founding fathers fought for. But some statesmen do see that the excesses of labor union bosses have swung the pendulum in the opposite direction, and that in freeing themselves from oppressive employers, union members with the help of federal government pressures have enslaved themselves to bosses even more relentless and unenlightened. We have proof of this in a series of seven articles published in the *Chicago Tribune*, beginning October 1.*

This series, signed by Clayton Kirkpatrick, a staff writer, is a plain, unvarnished analysis, resulting from a study of nearly 100 international trade union constitutions. Unlike our Constitution of the United States, which was painstakingly designed to prevent centralization of power over the individual citizen, the constitutions of labor unions are specifically drawn to concentrate all powers in the hands of a few, hand-picked "leaders," who as a group are self-perpetuating.

*Subsequently published in pamphlet form and available from the publisher for 20¢ per copy, postpaid.

Union "Laws"

To begin with, the courts have generally held that labor unions are voluntary, private associations in the same class as clubs, religious groups, etc., and consequently are entitled to make their own qualifications for membership, set dues, and establish rules for governing their members. This view assumes that a person is free to join or to leave a labor union of his own volition. It does not fit the modern circumstance where to keep his job or earn a living a person must remain in good standing, not necessarily with his "union," but with the bosses, or dictators, who run the union, quite often for their own benefit rather than his. There is nothing new in this kind of a presentation, for intelligent friends of labor unions and labor union economists have written books about the lack of democracy in the government of labor unions. The virtue of the series of articles in the *Tribune* is their brevity and clarity.

FREE SPEECH: The Bill of Rights of the Constitution of the United States guarantees freedom of speech and conscience, yet most labor union constitutions forbid members, under pain of suspension or expulsion, from "slandering" any officer. The following from the constitution of the United Mine Workers is typical:

Any member guilty of slandering or circulating, or causing to be circulated, false statements about any member or any members circulating or causing to be circulated any statement wrongfully condemning any decision rendered by any officer of the organization, shall, upon conviction, be suspended from membership for a period of six months and shall not be eligible to hold office in any branch of the organization for two years thereafter. The above shall be construed as applying to any local officer or member reading such circulars to the members of a local union, or who in any way gives publicity to such.

Another example is from the constitution of the United Steelworkers of America:

Publishing or circulating among the membership false reports or misrepresentations, slandering or wilfully wronging a member of the international union, using abusive language or disturbing the peace or harmony of any meeting in or around any office or meeting place of the international union.

TRIAL BY JURY? The union officers are prosecutors, judge and jury, and in many cases there is no appeal from their decisions. Even where, for con-

sumption of the gullible, the constitution provides an elaborate setup for "fair" trials, there is often some qualifying clause like the following, from the by-laws of the American Federation of Musicians:

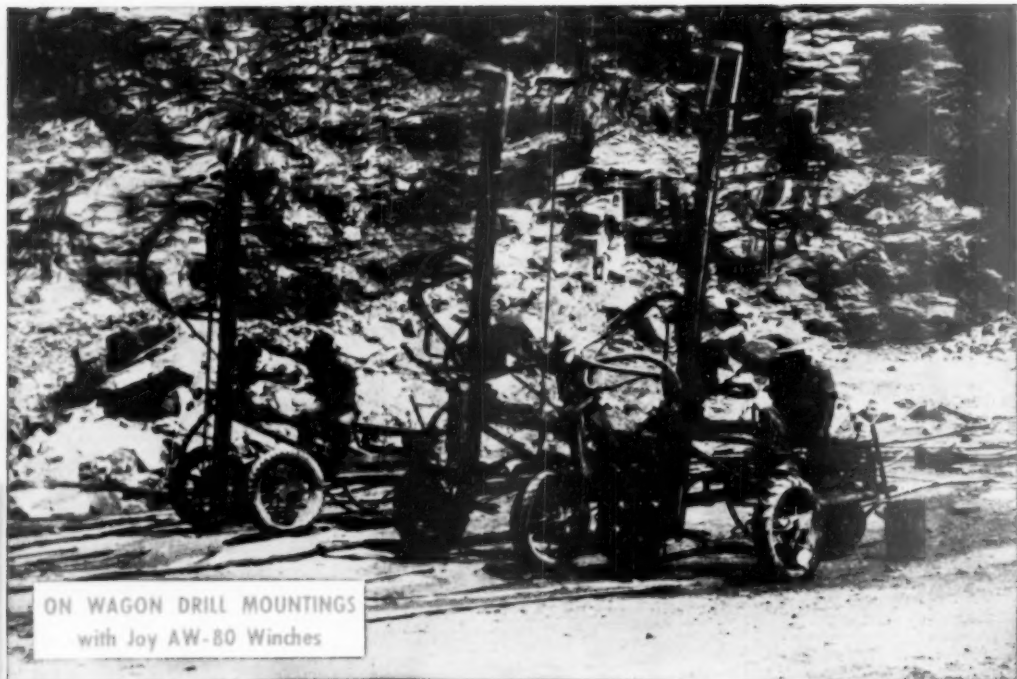
It shall be the duty of the president . . . to make decisions in cases where, in his opinion, an emergency exists, and to give effect to such decisions he is authorized and empowered to promulgate and issue executive orders, which shall be conclusive and binding upon all members and/or locals; any such order may by its terms: (a) enforce the constitution, by-laws, standing resolutions, or other laws, resolutions or rules of the federation, or (b) may amend and set aside same or any portion thereof, except such which treat with the finances of the organization, and substitute therefor other and different provisions of his own making.

ELECTIONS? The provisions for election of officers have been demonstrated to mean nothing to the rank and file. The constitutions of unions generally provide that the international president appoint, pay and control the international organizers, who constitute the union's political machine. The international president controls the conventions and appoints the convention committees. The election machinery, including the tellers, are dominated by the group in power. The local unions, which are supposed to elect the delegates, are at the mercy of the international ruling group, who, under their constitutions may suspend the local and seize its treasury. The international group runs the union publication, and can and does prevent publicity for rival candidates. Through the years, John L. Lewis, president of the United Mine Workers, has suspended the elected officers of 29 of his 31 district locals.

UNION FUNDS: The constitutions of labor unions are so drawn that in the average case the members have little or nothing to say about the disposition of the dues they pay, except such as are set aside for pensions or other social benefit. In many union constitutions the expenditure of funds is left entirely to the discretion of the international president and his executive committee. Until the Taft-Hartley Act it was not even necessary to render an accounting to members.

SALARIES: Union officers pay themselves well and some have more privileges than any monarch. For example, the president of the Teamsters' Union is to get \$30,000 annually, whether he works at it or not; he may travel at home or abroad, at pleasure, with all expenses of himself and wife paid for out of union funds. Some have homes provided by the union funds in Florida and other attractive places, together with gifts of the highest priced cars. Those who have them bring their brothers and sons into "the business," at fat salaries and presumably life-time jobs.

We urge our readers to send for the *Tribune* reprint of these articles. Then they will be in a much better position to understand the democracy of labor unions.

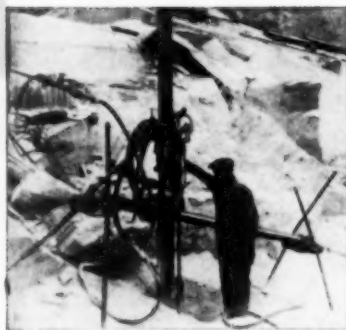


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LABOR RELATIONS TRENDS

Fine Distinction Between Primary and Secondary Boycotts

By NATHAN C. ROCKWOOD

IN THE JUNE, 1948, article on "Labor Relations Trends," we raised the question "Local Construction Does Not Affect Interstate Commerce?" Therein was detailed a case that the general counsel of the National Labor Relations Board brought into the U. S. District Court in Denver, Colo., with a petition for a temporary injunction to restrain the Denver Building and Construction Trades Council from picketing and boycotting a construction contractor to prevent him from employing a firm of electrical subcontractors which was using non-union labor.

The decision of the District Court, which we quoted at some length, was to the effect that the construction of this commercial building in downtown Denver did not "affect" interstate commerce within the meaning of the Labor-Management Relations Act, and consequently the case did not come under the jurisdiction of the National Labor Relations Board. It was one of Robert N. Denham's first cases to establish the jurisdiction of the Board over the construction industry, and was of more than ordinary interest on that account. We pointed out, in our 1948 article, that if this decision of the District Court was sustained, it might have an important bearing on the limits of the Fair Labor Standards Act (wage and hour law) because its application should be narrower than the generally much broader coverage of the L.M.R.A. so far as alleged interstate commerce was concerned.

Board Had Jurisdiction

The U. S. Circuit Court of Appeals of the District of Columbia on September 1, 1950, decided that the N.L.R.B. not only did have jurisdiction, but that it made a mistake in deciding that this was a secondary boycott, forbidden by the L.M.R.A. (Taft-Hartley Act). This court held that it was a primary strike or boycott, and therefore authorized by the law. In doing so it made some very fine new distinctions, that may affect many cases in which construction materials suppliers are involved.

A brief summary of the facts is as follows. Although the U. S. District Court at Denver ruled that the general counsel of the Board had no grounds for an injunction, in a strictly local construction job, the Board went ahead on the findings of its examiner and held the unions guilty of an unfair labor practice under Section 8 (b) 4 (A) of the Taft-Hartley Act. The case was carried to the U. S. Circuit Court of Appeals at Denver, but was dismissed with the consent of the Board. Apparently the Board had

lost interest in the case because the contractor discharged his non-union electrical subcontractor, and only union men were subsequently employed. The unions, however, wanted to get rid of the Board's unfair labor practice cease and desist order, and took the case to the U. S. Circuit Court of Appeals, District of Columbia Circuit. The Board answered with a request for enforcement of its order.

Points of Law Involved

There were several fine points of law involved, the first of which was whether the N.L.R.B. had jurisdiction over this kind of a local construction job; that is, whether the District Court at Denver had ruled correctly in deciding it hadn't. Then there was the question of *Res Judicata*, which according to a law dictionary means the question of whether the case had not already been legally disposed of. The court then had to determine whether or not the boycott was in fact the kind that the Taft-Hartley Act forbids. The best way to give the reader some idea of the importance of the distinctions made by the Court is to recite briefly the facts in the case. He will then be able to draw his own conclusions as to whether the Board or the Court comes nearest to his own reasoning.

Facts in the Case

The Court's decision gives a summary of the facts in part as follows: The contractor was constructing a commercial building. There was a subcontractor for some electrical work and supplies. His employees were non-union. All other employees on the job, including those of the other subcontractors as well as of the contractor, were members of the craft unions affiliated with the Building Trades Council. A labor representative complained to the electrical subcontractor about non-union men working on the job, and reported to the business representative of the Council that the contractor was using the services of this subcontractor. The Council decided to place a picket stating that this job was unfair to the Council. After advising the members of the contracting and of the electrical subcontracting firms that union men would not work on the job with non-union men, they said that if the subcontractor continued to work there, the Council would have to picket the job as "unfair." The picketing was carried out for 13 days, during which no union members worked on the job.

The Board had claimed jurisdiction because of the effect on interstate commerce, although the electrical sub-

contractor bought only \$55,000 worth of materials from outside the state (some 65 percent of all his purchases), and the total value of all his materials used on this job was only \$348.55. The Court of Appeals did not "disturb" this assertion of jurisdiction. It held that: "The impact of industrial strife on interstate commerce at its destination, as well as at its origin, is sufficiently close to meet the requirements of the statute and the Commerce Clause" (of the Constitution).

In settling the question of *Res Judicata* (that the case had already been disposed of, raised by N.L.R.B. attorneys) the Court of Appeals held that the Board's action in issuing an order subsequent to the Colorado Court's decision gave the case a new lease of life, since a U. S. Court of Appeals or the U. S. Supreme Court has the power to review any order of the Board.

Held a Primary Boycott

In deciding that the walkout of the union members was a legitimate strike and not a secondary boycott, the Court's decision goes into considerable detail, the substance of which is as follows: The context of the words, in Section 8 (b) 4 (A) of the Act "cease doing business" and the meaning attributed to them by the legislative history of the Act, by the N.L.R.B., and by the Courts, require that they be construed as condemning as an unfair labor practice a secondary boycott or strike but not primary action even when an object in a limited sense may be construed to be to force or require an employer to cease doing business with another. The effective sense must be that of the statute. It is realized that when a statute is sufficiently broad in terms to cover a situation, it will ordinarily be construed to do so even though other and different situations were in the mind of Congress at the time of enactment. Nevertheless, the scope of a statute must still be interpreted so as to carry out the intent of Congress. * * * Since it is clear the "cease doing business" clause, when read with the clause preserving the right to strike (Section 13), except as specifically provided, is not to be literally construed, its bounds must be sought. The history of the clause before, during and since enactment, in Congress, before the N.L.R.B. and in the courts, places primary labor action outside these bounds.

The peculiar conditions which made this a primary and not a secondary boycott were described by the Court about as follows: The picketing and resulting strike were at the premises of the contractor where the subcontractor's men were at work. It grew out of a controversy over the conduct of the contractor in participating in the bringing in of the non-union men on to the job as well as over the conduct of the electrical subcontractor in

(Continued on page 92)

Common-Sense Equipment Protection during STEEL SHORTAGES

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Two ways to fight steel shortages with **STOODY ALLOYS**

● This illustration shows a worn RD-8 Tractor Idler wheel manually hard-faced with Stoody Self-Hardening. It outwore two new wheels. Application cost was only a fraction of replacement cost.

● Above are typical idlers automatically hard-faced with Stoody 105. Automatic welding insures greater smoothness and uniformity of deposit besides lowering cost.

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the Personal Side of the news

Heads Cement Corporation

DAVID E. WILLINGHAM, formerly general superintendent, has been elected president of the Louisville Cement Corp., Speed, Ind., subsidiary of the Louisville Cement Co., Louisville, Ky. Mr. Willingham, who attended Evansville Engineering College, joined the Speed, Ind., plant of the Louisville Cement Co. in 1925 as draftsman and subsequently was promoted to plant engineer, assistant superintendent and then superintendent of the portland cement division. In 1945 he was made general superintendent of the plants at Akron, N. Y., Milltown, Ind., and Speed, Ind.

Honors to Fred Coppock

AT THE RECENT meeting of the Board of Directors of the National Sand and Gravel Association, Sun Valley, Idaho, the following resolution was unanimously adopted:

"The Board is happy to extend its warmest congratulations to Fred Coppock, president of the American Aggregates Corp., Greenville, Ohio, on the auspicious occasion of the celebration of his 50th anniversary in the sand and gravel industry.

"The Board joins with the friends of Mr. Coppock in all parts of the United States in testifying to their affectionate regard for him and to their admiration for the great work which he did in pioneering the development of the commercial sand and gravel industry. Mr. Coppock entered the industry as a very young man in 1900, opening up a gravel deposit at Laura, Miami County, Ohio, where he loaded gravel by hand, transporting it by wheelbarrow to the railroad car. Two years later Mr. Coppock and an associate acquired a large tract of gravel land in Darke County, Ohio, near Greenville. There he built what came to be known as the Ft. Jefferson plant and the initial operations used the same hand methods employed at Laura.

"Within a short time, Mr. Coppock and his associates purchased the first piece of production equipment, a steam shovel, and in 1909 he erected one of the first sand and gravel washing, crushing and screening plants in the history of the industry. In 1911 the growing business was incorporated under the name of the Greenville Gravel Co., and Mr. Coppock's operations steadily expanded. Today the company which he heads owns and operates plants in Ohio, Indiana and Michigan, and has also operated in other states. It is a significant fact that the total production of sand and gravel in the United States in 1940 was 69,410,436 tons, valued at \$21,-

037,630. As Mr. Coppock celebrates his 50th anniversary in our industry, we look back to a sand and gravel production in 1949 of 319,104,000 tons, valued at \$248,443,000. Mr. Coppock symbolizes the initiative, the imagination and the enterprise which have been responsible for establishment of the sand and gravel industry as one of the essential forces in the economic life of our country.

"Mr. Coppock's business life has included other industries besides sand and gravel, and yet we who know him best believe that his heart has always been wrapped up in the sand and gravel business. This business is his first love. We have enjoyed our close association with him through the years and we acknowledge with gratitude his constant personal interest in the National Sand and Gravel Association and his faithful support of the organization throughout its existence.



Fred D. Coppock

"We take the utmost pleasure in announcing that Fred Coppock has this day been made an honorary member of the Board of Directors of the National Sand and Gravel Association for life. This is an expression of our indebtedness to him for his great contributions to the orderly growth and sound development of the sand and gravel industry and it is an expression also of our personal regard for him as a man and as a friend. We tender also our warmest congratulations to Mrs. Coppock, his devoted wife, who has been at his side while he made his career in our industry."

HARRIS N. SNYDER
PRESIDENT

Research Engineer

ALBERT LITVIN, materials engineer for the National Bureau of Standards, Washington, D. C., has been named structural engineer at Armour Research Foundation of Illinois Institute of Technology, where he will do research in the field of lightweight aggregates and concrete. Mr. Litvin supervised the cement testing laboratories of the bureau at Washington and was responsible for the testing of cement for many large government projects. A graduate of the University of Illinois where he majored in civil engineering, Mr. Litvin joined the Bureau of Standards in 1941 after working for the International Boundary Commission in Texas and the Department of Subways and Super highways in Chicago.

Heads Advertising

WESVERN I. NEFF has been appointed head of the advertising and public relations department of San Xavier Rock and Sand Co., Phoenix, Ariz., according to an announcement by E. O. Earl, president of the company. Mr. Neff has a wide background in industrial advertising. Before the war, he was traffic manager of Advertising Publications, New York, N. Y., publishers of *Advertising Age* and *Industrial Marketing*. During the war he served five years in the Signal Corps. After his discharge from the service, he joined the Kelly-Nason advertising agency in New York and later the Shappe-Wilkes advertising agency. He moved to Arizona in 1947 and established his own agency, later going into partnership in the firm of Henderson-Neff advertising where he was in charge of the art and production departments.

Author of Lime Article

ROBERT S. BOYNTON, general manager of the National Lime Association, Washington, D. C., is author of an article on "Lime—An Industrial Chemical" appearing in the July, 1950, issue of *Chemical Engineering* (formerly known as *Chem. & Met*) which is published by McGraw-Hill Publishing Co. One of the principal objectives of Mr. Boynton's article is to convince readers of the magazine (largely chemists and engineers) that lime should be regarded as one of our most important basic chemicals as well as being our lowest cost alkali.

Elected Treasurer

THOMAS P. BLACK, president of the Black-White Limestone Co., Quincy, Ill., has been elected treasurer of the Industrial Association of Quincy.

Association President

ALBERT R. SHIELY, vice-president of J. L. Shiely Co., Inc., St. Paul, Minn., has been elected president of the newly formed regional group of commercial aggregate producers known as the North Central Commercial Aggregate and Ready Mix Concrete Producers Association, which includes members from Minnesota, North Dakota, South Dakota and western Wisconsin. The new regional association is affiliated with the National Ready Mixed Concrete Association and the



Albert R. Shiely

National Sand and Gravel Association. Other officers are: H. J. Taylor, Austin Ready Mix Concrete Co., Austin, Minn., first vice-president; L. J. Allen, Landers-Norblom-Christensen Co., Minneapolis, Minn., second vice-president; and A. J. Bryce, Certified Concrete Co., St. Paul, Minn., secretary-treasurer. Directors of the association are as follows: For a one-year term: J. P. Everist, L. G. Everist, Inc., Sioux Falls, S. D., and W. P. Radichel, North Star Concrete Co., Mankato, Minn. For a two-year term: E. W. Brown, Whitney's, Duluth, Minn., and George P. Friese, La Crosse Concrete Co., La Crosse, Wis. For a three-year term: A. J. Egan, Industrial Aggregate Co., Minneapolis, Minn., and L. V. Madsen, Twin City Ready Mix Concrete Co., Minneapolis, Minn.

Vincent P. Ahearn, secretary of both the national associations, gave a talk on "Washington and Korea" at the organizational meeting of the new association.

Typical New Englander

WILLIAM (BILL) MOORE, president of the National Ready Mixed Concrete Association, is such a modest, retiring type of New England gentleman, that even few of his intimates in the Association know very much about his background, except that he manages one of the oldest builders' supply companies in Boston, Mass. Mr. Moore has been with this firm, J. P. O'Connell Co., dealers in masons and plasterers supplies, since 1928. In recent years ready-mixed concrete has become a large factor in this firm's business, and Mr. Moore has been a prime mover in this development.

Bill Moore was born in Gloucester, Mass., perhaps the most famous city in the Bay State next to Boston itself, for Gloucester has been the home of the rugged, sea-faring Yankee since Colonial times, most famous per-

haps for its fishermen, but the town also furnished many mariners who sailed the seven seas in the days of the full-rigged ships. In this environment Bill Moore grew up and went to Phillips-Andover Academy, one of the oldest and most famous New England preparatory schools, where he graduated in 1914.

Bill then entered Harvard University with the class of 1918. Those who know him, and are familiar with his physical make-up, probably won't be surprised to know that he was a notable athlete. In fact, in addition to the usual college sports, he was captain of the Harvard track team, which went to Paris, France, in 1919 as part of the Interallied Track Team, to participate in the first revival of international sports following the first world war.

Mr. Moore began his career, as did many a young college graduate in the "roaring 20's," with the investment bankers, Estabrook & Co., Boston. He graduated from that into a more stable business, before the great depression, in 1928, to the J. P. O'Connell Co., as already noted. There, ready-mixed concrete was added in 1930, and this branch of the business has been his main interest since. It serves not only Boston but most of the outlying suburbs.

However, that is only one of Bill Moore's business interests. He is president of the Cape Ann Savings Bank at Gloucester and a director of the Gloucester National Bank. He is a member of the city's Board of Water Commissioners and is its current president. Other business interests include the presidency of the Marshall C. Spring Corp., Wellesley, Mass., a building supplies concern.

In spite of these many business interests, Bill Moore finds time for many



William Moore

civic services. To begin with he served his country in World War I as a first lieutenant of infantry, putting in 16 months overseas in the A.E.F. in France as a G-2 (intelligence) on the general staff in France. He achieved his military education at the Plattsburg, N. Y., training camp for civilians, where many young men of that

period were introduced to military life. So, that made him eligible for membership in the American Legion, of which he is a charter member, past-commander and a trustee.

At home, in Gloucester, Bill Moore is a director and treasurer of the Cape Ann Lyceum and Sawyer Free Public Library, an ancient institution, typical of New England culture, long before Mr. Carnegie began establishing public libraries. He is also a trustee of the Addison-Gilbert Hospital, Gloucester, and a director of the New England Alumni Association of Phillips-Andover Academy, which probably has more distinguished members than any other Prep school not excepting F.D.R.'s Groton.

As a family man he has a fine wife who many of his fellow directors and members of the National Ready Mixed Concrete Association have met. They have six children, three boys and three girls, ranging in age from 13 to 24 years. The oldest boy, following in the footsteps of his dad, was a marine in World War II.

The editors felt that having given some prominence to the Cornell University influence in the National Sand and Gravel and National Ready Mixed Concrete Associations, it is only fair to old Harvard to show that it is also represented.

Celebrates 80th Birthday

JAMES LEENHOUTS, treasurer and general manager of the Grand Rapids Plaster Co., Grand Rapids, Mich., and former president of the Gypsum Association, Chicago, Ill., was honored by family and friends recently on the occasion of his 80th birthday. Mr. Leenhouts joined the plaster company in 1890 as an office employee. In 1901 he was elected to the board of directors and to the office of treasurer and general manager, and has been re-elected to these positions for 50 consecutive years.

Joins Phosphate Firm

LEVON MICHAELS has accepted a sales position with the Turinsky Lime Co., Oklahoma City, Okla. He was formerly administrative officer of the P.M.A. office in Purcell, Okla.

Named Vice-Presidents

DAN SANBORN and C. A. SANBORN have been elected vice-presidents of the Lehigh Stone Co., Kankakee, Ill., and GLENN A. SHUNK has been appointed general manager of the firm.

Buys Gravel Plant

GEORGE N. CHILDS and R. C. Tate, Black Rock, Ark., and A. J. Blatz and Henry Blatz, Walnut Ridge, Ark., have purchased the Lutessville Sand and Gravel Co., at a cost of \$100,000. The plant will be operated under the name of George N. Childs, Inc.



American Concrete Pressure Pipe Association held its executive committee meeting at The Homestead, Hot Springs, Va., August 3-4. Those attending, seated left to right, were: Director E. L. Johnson, Concrete Conduit Co., Colton, Calif.; President R. V. Edwards, American Pipe & Construction Co., South Gate, Calif.; Director R. A. Foley, Gifford-Hill-American, Inc., Dallas, Texas; A. M. Mirsh and Vice-President P. R. Mirsh, Lock Joint Pipe Co., East Orange, N. J.; J. W. Porter, Gifford-Hill-American, Inc., Dallas, Texas; Secretary-Treasurer H. S. Price, Jr., Price Brothers Co., Dayton, Ohio.



American Concrete Pipe Association's Technical Problems Committee meeting was held at the Blackstone Hotel, Chicago, Ill., July 28. Those in attendance, seated left to right, were: E. F. Bepalow, Chocaw, Inc., Memphis, Tenn.; President E. M. Fox, Cincinnati Concrete Pipe Co., Cincinnati, Ohio; Chairman M. S. Allen, Lock Joint Pipe Co., Kansas City, Mo.; Treasurer J. D. Mollendorf, Continental Concrete Pipe Co., Chicago, Ill.; I. E. Odendahl, Elk River Concrete Products Co., Minneapolis, Minn.; A. M. Herman, Concrete Conduit Co., Colton, Calif.

OBITUARIES

MYRL FRENCH, manager of the Hersey Gravel Co., Hersey, Mich., died September 15 following a heart attack. He was 44 years old.

WILLIAM R. REID, chairman of the board of The Torrington Co., Torrington, Conn., died September 16 following a short illness. He was 71 years of age. Mr. Reid had been with the

company for 50 years and had served as president for 22 years. He had been chairman of the board for the past four years.

WILLIAM POWELL, safety director for Medusa Portland Cement Co., Cleveland, Ohio, died recently at the age of 64. He had been safety director for 21 years. Born in Chicago, Ill., most of Mr. Powell's business life was spent in accident prevention work. He started his safety career as chairman of a departmental safety committee at

the Illinois Steel Co. in South Chicago in 1912. For a time he was safety inspector and safety engineer for the E. I. du Pont de Nemours Co., heading the safety department at the company's Hopewell, Va., munitions plant during World War I. Mr. Powell joined Medusa as safety director in 1929. He was a senior member of the accident prevention committee of the Portland Cement Association, having served continuously since 1938. In 1942-43 he was general chairman of the Cement and Quarry Section of the National Safety Council.

STEWART H. DEWSON, chief engineer for Pennsylvania-Dixie Cement Corp., New York, N. Y., passed away September 13 following a short illness. Mr. Dewson started his career in the engineering field as ship draftsman in the Hull Division, U. S. Navy, and later as draftsman for the Fuller Engineering Co. After serving as plant engineer for Whitehall Cement Co., he was appointed assistant conservation engineer for the Portland Cement Association. Following this assignment, he became associated with the Pennsylvania Cement Co. as chief engineer and held this position until the merger of Penn-Dixie when he was named chief engineer of the Northern Division, and later assistant to the chief engineer for all plants. He has been chief engineer since January, 1950.

GEORGE C. ADAMS, sales representative for Joseph T. Ryerson & Son, Inc., Chicago, Ill., died September 14 at the age of 59. He had been with the company 38 years, the major portion of this time serving as sales representative in the Chicago metropolitan area.

GAIL B. HAMER, president of the Dayton Builders Supply Co., Dayton, Ohio, passed away recently.

EARLE S. HENNINGSEN, retiring manager of engineering of the large motor and generator divisions of the General Electric Co., Schenectady, N. Y., died September 23 after a brief illness. He was 60 years old. A pioneer in the development of alternating-current machinery, Mr. Henningsen was to have retired October 1 after 28 years of service with the company.

HUGH H. POWELL, personnel relations director at the Oakland, Calif., office of Oliver United Filters, Inc., New York, N. Y., died August 31 at his home in Castro Valley, Calif., after a short illness.

Opens Quarry

M. M. GREEN AND L. M. GREEN will open a rock quarry in LaFayette county, Waverly, Mo. M. M. Green operates other quarries at Mandeville, Richmond and Blue Mound.

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compression and combustion. No wonder efficiency goes up, costs come down!

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TUNE IN ... TEXACO STAR THEATER starring MILTON BERLE on television every Tuesday night. See newspaper for time and station.



INDUSTRY *News*



Northwestern Portland Cement Co. is now using Kenworth trucks and Utility trailers illustrated above, to haul bulk cement. The trucks are lightweight (constructed mostly of aluminum) and can haul 110 bbl. of cement per trip. The trailers have a 625-cu. ft. capacity. The sharply inclined hopper enables an unloading time of 20 min. to one hour.

Talc Production

GOVERNUR TALC CO., Gouverneur, N. Y., is now equipped to produce talc in finenesses 50 times smaller than can be seen by the human eye. The Gouverneur plant has a production of 200 tons of talc per day, the talc being reduced to micron and submicron sizes by a pneumatic-powered mill. Compressed air to drive the mill is furnished by an Ingersoll-Rand compressor which is driven by a GE 1750-hp., 4160-volt synchronous motor. There are only a few pounds of talc in the mill at any given time, but the speed of circulation through it is so high that as much as six tons will pass a given point within the mill in one minute. Particles are reduced in size with each passage through the mill and as many as 1500 to 2500 passes may be required before some particles reach the desired size. The talc is used as a filler by paint, ceramic, cosmetic and other manufacturers.

Quarry Accidents

BUREAU OF MINES, U. S. Department of the Interior, in a recent bulletin stated that, while lower than those in coal and metal mines, the accident record in American quarries and related plants is still high enough so that quarrying ranks 11th among 15 major industries. From about 1916 to 1932, both fatal and non-fatal accident rates fell sharply, but little improvement has been made since that time.

Detailed recommendations for reducing hazards are given under 12 categories: falls or slides of rock, walls or overburden; drilling and channeling; explosives; falls of persons; machinery; haulage; electricity; handling materials; flying objects; falling objects other than rock; burns and other causes. The bulletin also emphasizes the value of an active safety organization at each operation.

The report was prepared by D. Harrington, former chief of the Bureau's Health and Safety Division, A. W. Worcester, Bureau mining engineer, and J. H. East, regional director of the Bureau's Region IV.

Texas Perlite Plant

PERLITE PRODUCTS CORP., Dallas, Texas, will begin production of Perlite lightweight plaster aggregate about December 1, Cooper C. Drury, president, has announced. The corporation was organized last August with a capitalization of \$110,000, and has a franchise from Great Lakes Carbon Corp. to produce "Permalite" for north and west Texas.

Contract has been let for construction of a plant, to be established west of the Lone Star Cement Corp. operation in Cement City. A prefabricated steel building, containing 6500 sq. ft., is being erected, and will house the office, furnace and storage space. Room is being left for a second furnace should demand require it. Dale R. Andrews, vice-president of the corporation, will be general manager at the plant site.

Enlarging Cement Plant

LAWRENCE PORTLAND CEMENT CO., New York, N. Y., is undertaking a program at its Thomaston, Maine, mill designed to increase the production of portland cement. The smaller of two rotary kilns now in operation will be replaced by a new and larger kiln which is expected to increase the mill's present annual capacity by approximately 50 percent. This kiln will be 11 ft. in dia. by 356 ft. in length.

Installation of the kiln will proceed as rapidly as material and accessories are received. It is estimated that probably about eight months will elapse before it can be placed in full operation. The company states that inasmuch as the smaller of the present kilns must be removed to make room for the new one, production next spring will fall below current levels for two months or more while the change is being effected.

Also included in the company's plans are six additional Buell cyclone dust collectors, supplementing the battery of dust collectors installed earlier this year.

Buys Stone Company

THE MINNESOTA MINING AND MANUFACTURING CO., St. Paul, Minn., has purchased the Big Rock Stone and Material Co., Little Rock, Ark. R. S. Wilson, Sr., president, will continue as active head of the concern. The business will be operated as a wholly-owned subsidiary with no major changes in operation contemplated. Big Rock owns and operates two stone quarries, a crushing plant, a ready-mixed concrete plant, and a sand dredging fleet.

Safety Awards

THE THOMAS PLANT of the Birmingham Slag Co., Birmingham, Ala., and the Chicago plant of France Stone Co., Chicago, Ill., won the top safety awards in the first annual National Slag Association Safety Competition, sponsored by the Bureau of Mines. Bronze trophies, provided by *PI* and *Quarry* magazines, were awarded to these two plants. In addition to the trophies, each employee and official received a Certificate of Accomplishment in Safety. The Thomas plant operated a total of 67,259 man-hours in 1949 without a fatality or lost-time accident. The Chicago plant also had an injury-free record, operating a total of 50,690 man-hours.

Minerals Yearbook

BUREAU OF MINES, Department of the Interior, has announced that the 1948 edition of *Minerals Yearbook*, authoritative source of information on both domestic and foreign mineral commodities which is compiled annually by the Bureau of Mines, is now available for distribution. The volume, increased to 1626 pages, reviews the production, distribution and consumption of all mineral commodities, including fuels. Also discussed are employment and injuries in the mineral industries in 1948. Commodity reviews on both metals and nonmetals, as well as state reviews, have been written and edited by specialists in each field, based on information furnished by the mineral industries, government agencies, trade associations, and scientific and other journals.

Increase in ACP Appropriation

THE SENATE COMMITTEE recently added another \$500,000 to the 1950 ACP appropriation, increasing it to \$283,000,000. Also, the clause limiting to 5 percent the amount of the appropriation to be used in soil conservation was struck from the measure. The 1951 appropriation remains at the previously set \$285,000,000. There is some progress at the present time to have the 1952 appropriations increased to \$400,000,000.

Installs New Kiln

LAWRENCE PORTLAND CEMENT CO.'S Northampton, Penn. plant is installing a third rotary kiln as a part of its modernization program. The kiln is 9 x 314 ft. in diameter, dry process, and will produce an estimated 2000 bbl. of clinker daily. Another feature of the plant's expansion program is the installation of two raw blending silos of 10,000 bbl. capacity.

Opens Perlite Plant

BUFFALO PERLITE CORP., a newly formed company, has erected a \$100,000 plant in Cheektowaga, N. Y., for the production of expanded perlite aggregate. Fred Seitz, who also has a lathing and plastering business in Cheektowaga, is president of the company, and Howard W. Mason is the production and sales manager.

Lone Star to Construct New Plant in Texas

LONE STAR CEMENT CORP., New York, N. Y., has started construction of a new cement plant near Sweetwater, Texas. The mill, when completed in the latter part of next year, will have an annual productive capacity of between five and six million sacks. It will be Lone Star's seventeenth plant

and its third in Texas. When completed it will employ about 250 persons.

Adjacent to the cement mill, where the limestone quarries are located, a large crushing plant will be constructed. Other facilities will include 15 storage silos, a machine shop, and an office building, which will include a laboratory.

Portland Cement Production

THE PORTLAND CEMENT industry produced 21,884,000 bbl. of finished cement in August, 1950, as reported to the Bureau of Mines. This was an increase of 17 percent compared with the output in August, 1949. Mill shipments totaled 25,144,000 bbl., an increase of 6 percent over the August, 1949 figure, while stocks were 33 percent below the total for the same month in 1949. Clinker production during August, 1950, amounted to 20,678,000 bbl., an increase of 13 percent compared with the corresponding month of the previous year. The output of 21,884,000 bbl. of finished cement during August, 1950, came from 148 plants located in 35 states and Puerto Rico. During the same month of the previous year 18,715,000 bbl. were produced in 146 plants.

Agstone Plant Opened

CONCRETE MATERIALS & CONSTRUCTION Co., Cedar Rapids, Iowa, has opened a quarry at Union Grove Lake for the production of road stone and agricultural limestone. Manager of the plant is E. F. Farichild.

Firing Seismic Blasting Caps

AN IMPROVED electrical blasting circuit permitting more accurate recording of rock vibrations is described in a new publication released by the Bureau of Mines as part of its investigation of dynamic stresses in rock. Records of rock vibrations obtained through the use of an earlier apparatus developed by the Bureau proved unsatisfactory due to "firing hash" or spurious vibrations that appeared on the records at the time of detonation, according to the report. To eliminate this difficulty, Bureau scientists evolved the electrical firing circuit described in the current publication. Engineering details together with a diagram of the newly-designed apparatus are included. Free copies of Report of Investigations 4705, "A Circuit for Firing Seismic Blasting Caps," may be obtained from the Bureau Publications Distribution Section, 4800 Forbes St., Pittsburgh 12, Penn.

Stream Pollution Reports

U. S. PUBLIC HEALTH SERVICE, for the next two years, plans to issue the first extensive series of river-basin reports. These reports, totaling about 350, will be of two different types. The technical reports on separate river basins will give data on existing conditions and will propose basin plans and standards; these reports will be of value to engineers and technicians. The second type will be popular reports for laymen, giving information concerning stream pollution problems.

Coming Conventions

January 16-18, 1951—

National Agricultural Limestone Association, 5th Annual Convention, Hotel Statler, Washington, D. C.

January 22-25, 1951—

National Concrete Masonry Association, Annual Meeting and Concrete Industries Exposition, Cleveland Auditorium, Cleveland, Ohio.

February 5-9, 1951—

National Crushed Stone Association, 34th Annual Convention, and Agricultural Limestone Institute, 6th Annual Convention, Netherland Plaza Hotel, Cincinnati, Ohio.

February 11-15, 1951—

National Sand & Gravel Association, 35th Annual Convention, and National Ready Mixed Concrete Association, 21st Annual Convention, Roosevelt Hotel, New Orleans, La.

March 1-3, 1951—

American Concrete Pipe Association, Annual Convention, Waldorf-Astoria Hotel, New York, N. Y.

March 12-14, 1951—

American Road Builders' Association, 48th annual meeting, Schroeder Hotel, Milwaukee, Wis.

Radio for Florida Phosphate Mines

INTERNATIONAL MINERALS & CHEMICAL CORP., Chicago, Ill., has just been issued a construction permit by the Federal Communications Commission for a radio communication system to be installed at its phosphate mines in the Florida pebble field. International's Florida mines consist of three open-pit mines situated at driving distances of 4, 12 and 16 miles from the company offices and maintenance facilities. Because of this arrangement, maintenance personnel had to spend up to 50 percent of their time driving from one mine location to another and back to the shops at which they are based. Radio installation will permit contact with these individuals while they are in the field and in their cars between jobs.

The system consists of a 60-watt base station located near the maintenance shops, and 16 mobile units located in the automobiles used by the maintenance personnel. Two of the mobile units will be located on draglines at the mines. The system will operate in the 152-162 mc band, using frequency modulation. The equipment is being manufactured by Motorola.

Gypsum Wallboard Plants

UNITED STATES WALLBOARD MACHINERY CO., New York, N. Y., recently completed installation of the eighth complete gypsum wallboard plant the firm has completely designed and installed in foreign countries. This newest plant was built for the United Papers Mills Ltd. in Myllykoski, Finland.

All of the machinery, including wiring and piping for these plants is of American manufacture and was shipped abroad as a complete unit. Other plants the company has erected abroad are: Gyproc Products Ltd. at Rochester, Kent, England and at Glasgow, Scotland; Rigas Gypps, Riga, Latvia; Australian Plaster Industries Ltd., South Melbourne, Australia; Gyptex Ltd., Kingscourt, Ireland; Cia Industrial El Volcan in Santiago, Chile, and Gypsum Industries Ltd., Capetown, Union of South Africa.

Perlite Deposits in Washington

RECENTLY RELEASED by the state printing office of Washington is a report of investigations of deposits of perlite and other volcanic glass occurrences in that state. Subjects treated in the booklet, by headings, are: Perlite—general description, thermal expansion, origin, utilization, physical characteristics, and occurrences (the same general heads are used in covering the field of other volcanic glasses). It is felt by the author, Marshall T. Huntting, that the state's deposits will not be available

commercially until some method is devised to lower the cost of separating the non-expandable crystalline material from the perlite glass.

Iranian Cement Plant Development

THE FIRST PRACTICAL RESULTS in Iran's seven year industrial development program can be seen in the construction of a modern cement plant at Shiraz. Prime contractor for the plant is Westinghouse Electric International Co. The company is also responsible for the supply of all machinery for the plant, amounting to \$2,277,000. Total cost of the enterprise is estimated at \$6,000,000.

The new plant of the Shiraz Cement Co., located in the southwestern provincial capital, has been designed to produce 200 tons of cement daily. This is expected to effect a 100 percent increase in national production, now about 60,000 tons annually. It will provide the building industry with locally produced cement for the first time.

Soil Testing Survey

AGRICULTURAL LIMESTONE INSTITUTE, Washington, D. C., has made a national survey to determine the facilities that are available to farmers in various states for the testing of farm soils. A summary of this survey has now been published. It gives an alphabetical listing of the states and includes for each state such information as where tests are made, types of tests made, service charges, and the approximate number of samples tested in 1949.

Perlite and Pumice for Ceramics

THE OREGON STATE DEPARTMENT of Geology and Mineral Industries has developed a new use for volcanic glass. When used in a ceramic glaze, the glass produces a glaze suitable for stoneware, artware and terra-cotta products. Finely ground pumice, volcanic ash, and perlite, forms of volcanic glass found mainly in the central and eastern parts of the state, can be used to replace more costly materials shipped into the area from considerable distances. The glaze was perfected after nearly two years of research. Results and test data have been published in a paper entitled "Glazes from Oregon Volcanic Glass" which may be obtained from the State Department of Geology and Mineral Industries, 702 Woodlark Building, Portland 5, Ore.

Change of Address

MARBLEHEAD LIME CO., Chicago, Ill., general offices have been moved to 1710 Mercantile Exchange Building, 308 West Washington St., Chicago.

Record-Keeping Regulations Under F.L.S.A.

NEW REGULATIONS are now effective covering record-keeping requirements under the Fair Labor Standards Act as amended. No particular order or form of records is required; however, payroll records must be preserved for at least three years. Individual contracts or collective bargaining agreements must be preserved for the same time. Other records need be kept for only two years.

Employers whose employees are subject to the law must keep the required records "safe and accessible at the place of employment, or at an established central record-keeping office." Under the law, all records must be available at any time for inspection by any duly authorized representative of the Administrator.

Booth Displays

AGRICULTURAL LIMESTONE INSTITUTE has been authorized by its Board of Directors to prepare appropriate exhibits or displays, on a rental basis, for use in booths at fairs and shows to promote the sale of agricultural limestone. Two of these exhibits have been completed and are ready for shipment to member firms who wish to use them.

Fluorspar Mine Closed

The Colorado Fuel & Iron Corp., Denver, Colo., has closed its Wagon Wheel Gap fluorspar mine. According to George H. Rupp, manager of the mining department, the shutdown will conserve fluorspar deposits owned by the company. Future supplies will be purchased from outside sources.

Newfoundland Cement Mill

THE GOVERNMENT OF NEWFOUNDLAND has signed an agreement with Miag Ltd. of Germany for the construction of a new cement mill on the island's West Coast near Corner Brook. The new mill will have a capacity of 100,000 tons of cement and 35,000 tons of agricultural limestone annually. Estimated cost of the new enterprise is \$3,000,000.

Pavement Yardage

AWARDS OF CONCRETE PAVEMENT for the month of September and for the first nine months of 1950 have been announced by the Portland Cement Association as follows:

	Square Yards Awarded During September 1950	Square Yards Awarded During First Nine Months 1950
Roads	1,333,225	23,317,141
Streets & Alleys	2,304,471	21,986,192
Airports	876,835	2,797,634
Totals	4,514,471	48,100,967

HINTS *and* HELPS

PROFIT-MAKING IDEAS DEVELOPED BY OPERATING MEN

Truck Hopper Design

THE PHOTOGRAPH SHOWS a truck hopper feeding a Farrell-Bacon primary jaw crusher at a western installation. A welded steel bumper is used



Bumper places rear truck wheels over strong concrete retaining wall



Drawing indicates how truck wheels are positioned on wall

to position the rear wheels of trucks exactly over the concrete retaining wall. The face of the bumper is sloped to eliminate tire cutting. The purpose of dumping while the rear wheels are over the retaining wall is to minimize the deep ruts that ordinarily develop.

Wetting Agents for Better Drainage

THE USE OF WETTING AGENTS in some of the rock products industries has been confined principally to problems relating to dust in the silica and foundry sand industries. Some dry dusty materials, when wet with water, tend to form into globules and as a result have inefficient wetting. There are a large number of wetting agents such as the Aerosol group (American Cyanamid Co.) available for the wetting down of dust.

One producer used a wetting agent to obtain better drainage of water through an outside storage pile. This pile of sand was built on a thick gravel

base and, without the wetting agent, drainage was not fast enough to suit his needs. The wetting agent, while not too costly to use, caused drainage of trapped water through the pile at such a rapid rate that there tended to be segregation; the fines were washed through so fast they eventually plugged up the gravel drainage base. The operator had to modify the amount of reagent he was adding.

This finding may be useful to an operator who wishes a more rapid drainage, or a lower and more uniform water content of his sand. Prevention of segregation will depend upon the individual installation.

Simple Bag Flattener

PROCESSING OF PERLITE in the West has assumed considerable importance. Scattered throughout the area are many small "popping" plants for exfoliating the crude rock into this white, lightweight aggregate. In the Los Angeles area, a new plant that cost in the six figure range recently opened its doors to the public to better acquaint people with the advantages of this exceptionally lightweight material and to promote its use as fine aggregate to replace sand in plastering with gypsum materials.

At this new and modern plant, much of the material is shipped in paper bags. As the filled bags leave the St. Regis packer they are quite bulky, although there are only a few pounds of plaster aggregate per sack. In order to flatten these sacks for better accommodation in trucks or cars, the simple bag leveler shown is used. It is mounted on casters for ease in handling.



Bag-flattener mounted on casters for ease in handling

Belt Unloader

AT A NEW DAM under construction in the North, belt conveyors are used almost exclusively for inter-plant transportation of materials. One of these long flat-running belts is used to deliver aggregate to one or more points. Instead of using a tripper, the

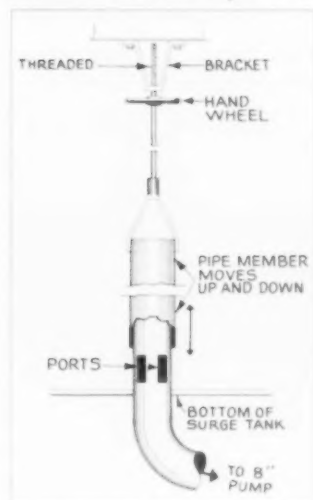


"V"-shaped scraper used to unload belt

engineers rigged up the "V"-shaped scraper shown. Located immediately under the belt is a large rectangular steel plate which can be raised vertically by means of a small hydraulic jack. When the plate is raised, the belt runs over it flat, enabling the scraper to do an efficient job. There are over 20 belts from 48 to 18 in. in use in this plant, and all ride Robins idlers. The belts were supplied by the Goodall Rubber Co.

Sleeve Valves to Control Slurry Flow

AT A WESTERN OPERATION three 8-in. Wilfley pumps are used on a pulp containing 52 percent solids. These



Hand-operated pipe sleeve valve for controlling slurry flow

are essentially booster pumps which receive their feed from a surge tank ahead of the pumps. Several types of valves were tried on this line, and the one shown in the drawing proved to be the most satisfactory. It is easy to install and to operate.



Valve hand wheels are visible over slurry surge tank

In the bottom of the tank are four outlets, of which three are in use. A hood-like cylinder in which ports have been cut has been welded over each outlet pipe. Over this is slipped a pipe of slightly larger diameter. When this latter pipe is all

the way down the ports are closed. A hand wheel with threaded rods at the top of each valve is used to raise and lower the outer pipe. When the valve is closed, any small amount of leakage soon stops because of the sanding-up characteristics of the pulp. The Wilfley pump must be fed by gravity as no vacuum is present on the suction side of the pump.

Oasis For Drivers

A SMALL PART of a Western plant's output is hauled by independent contractors. When the trucks are not in



Comfortable chairs keep waiting drivers near dispatcher's office

use they are lined up on the road at the left in the illustration, and the drivers may play cards or read under the beach umbrellas on the front yard. This keeps them within earshot of the truck dispatcher, whose office is at the right.

Low Transmission Line Marker

V-SHAPED SECTIONS made of light lumber cover low transmission lines at a Maine semiportable crushed stone plant to give trucks and loading equipment traveling over the area a clear reminder of the low lines. The plant also uses a 30- x 42-in. jaw crusher, and a 40-in. triple roll reduction unit that acts as a secondary and final reduction all in one relatively small but highly efficient package. The primary crusher is driven by a 165 hp. Murphy diesel and the triple roll by a D-13000 Caterpillar diesel.



Lumber V-sections remind drivers of low lines

Loading Haydite to Cars or Truck

AT A NEW HAYDITE PLANT in the North, several cylindrical steel silos are used to store finished materials.



Built-up rail bed facilitates truck loading

The silos are constructed alongside the railroad track so that open gondolas or closed hopper cars can be loaded by gravity from a chute. To make it easier for trucks to load from the same bins, the rail bed has been built up even with the top of the rails by means of thick planking.

Belt Tightener

SUPERLITE PRODUCTS, Calipatria, Calif., makes use of several simple belt tighteners at its pumice processing



Belt tightener in use at pumice plant

ing plant. Conveyor belts used are, for the most part, in the 24 to 18 in. width range. Climatic conditions permit the plant to operate without cover, and the belt tighteners are used on several of these outside conveyors. The support fastened to the outer end of the conveyor assembly is adjustable. The curved section under the platform is a flexible conduit carrying wires to the motor.

New Machinery



Hook-On Wattmeter

GENERAL ELECTRIC, Schenectady, N. Y., is manufacturing a hook-on wattmeter applicable to active and reactive power measurements in single

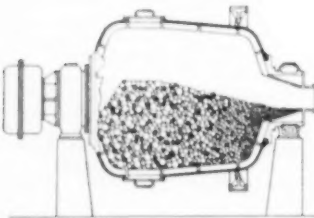


Hook-on wattmeter applicable to active and reactive power measurements in single and polyphase circuits

and polyphase circuits. Designated as Type AK-2, the new device enables measurements to be taken without service interruption, according to the manufacturer. It makes use of a removable magnetic hook to surround the current carrying conductor, and potential leads are connected as on a conventional single-phase wattmeter. In addition, a three-phase balanced power measurement is made possible by the hook-on unit. This is accomplished by passing two power leads through the hook, and connecting the potential leads. Through the use of a single dial switch, a selection of any one of six power measurement ranges is available to provide readings from 3 to 300 kilowatts full scale deflection.

Wet and Dry Grinding Mill

HARDINGE Co., Inc., York, Penn., has announced its new "Tricone" ball



New ball mill augments conical mill line

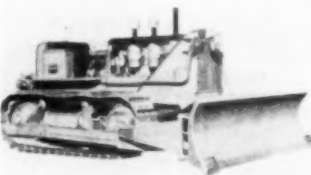
mill for wet and dry grinding and pulverizing applications. The manufacturer claims that the important feature of the mill is its slightly tapered shape, which keeps the larger grinding balls at the feed end of the mill. The unit was designed to augment the Hardinge conical mill line.

Structurally, the mill consists of a conical or convex feed head, a short cylindrical section, a long tapered conical section, and a wide angle conical or convex discharge head. The name is derived from the fact that three truncated cones are utilized in the design. In certain cases, the company states, the cylindrical section can be omitted entirely.

According to the manufacturer, operating advantages of the mill include: proper ball segregation (the large balls remain at the feed end to crush the coarser incoming material); maximum energy is gained at the feed end where diameter is greatest; the convex heads increase ball turbulence; the nearly spherical shape provides maximum working volume for minimum liner surface, and the tapered design results in less wear on the discharge grate.

Eliminate Bulldozer Overhead Frame Structure

SOUTHWEST WELDING & MANUFACTURING Co., Los Angeles, Calif., has developed its type G bulldozer without

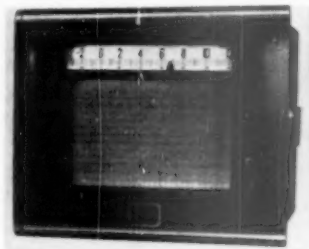


Bulldozer attachment without overhead frame

an overhead "A" frame structure. This design is reported to provide proper balance of the unit for the entire length of the tread as well as creating better visibility for the operator. These units have been designed to fit current models of Allis-Chalmers and Caterpillar tractors. Available in either the rigid or tilting bowl type, this equipment can be furnished for either front or rear mounted control units.

New Electronic Recording Instruments Introduced

THE BRISTOL Co., Waterbury, Conn., has announced the development of a new line of strip-chart electronic instruments, described as the Series 500



Strip-chart recorder can measure many variables

Strip-Chart Dynamaster electronic instruments. According to the manufacturer, this instrument is a high-speed, self-balancing a-c bridge designed for measurement of temperature, resistance, conductivity, strain, position, inductance, pressure, force, or any other variable which can be measured in terms of impedance.

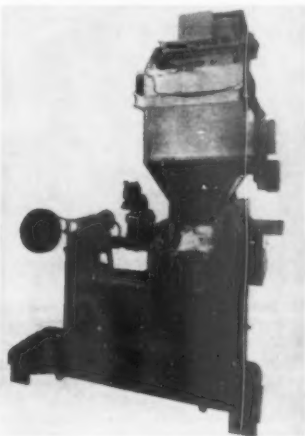
The instruments are housed in a moisture, fume- and dustproof case suitable for wall, flush-panel or front-of-panel mounting. The scale and recording mechanism are mounted on the front of a hinged aluminum alloy panel, which can be swung out to gain access to the electronic components or the control mechanism, the company states.

Vanadium Silicon Alloy Pistons

GILLET & EATON, Inc., Lake City, Minn., has developed the Micro-X piston of "Vanasil" vanadium silicon alloy. Vanasil, the company states, is as light or lighter than any aluminum alloy, yet has the low expansion characteristics of cast iron. Pistons can be fitted to cast iron clearances and are said to outwear several sets of other aluminum alloy pistons. Because of low expansion, solid skirt design can be used. Heat conductivity is like that of other aluminum alloys. Another feature of Vanasil listed by the firm is its porous "oil-absorbing" structure which is said to reduce both piston and cylinder wear and create a high resistance to scuffing and scoring.

Bag Packer and Closer

BEMIS BRO. BAG CO., St. Louis, Mo., has developed a new gravity packer for packing free-flowing commodities in either cotton or paper bags. This



Combined filling, weighing and bag closing unit

machine is a combined filling, weighing and bag closing unit, so designed that it can be operated with either one man or a two man crew. It will accurately weigh and pack products with a weight range of 50 to 140 lb.

The unit consists essentially of a net weighing scale, a pneumatically-operated oscillating mechanism which settles the contents of the bag, a dual bag closing unit which will sew either multiwall open-mouth paper or textile bags, and a conveyor. This conveyor is composed of four V-belts convolutely arranged so the filled bags will stand upright as they pass from the packing spout to the sewing head for closing.

The dual bag closing unit consists of one sewing head for textile and one for paper bags, the head that is not in use being swung up out of the way of the bags passing along the conveyor. A changeover from packing one type of bag to the other is accomplished by swinging the proper sewing head in place.

Two-Compartment Drum Separator Introduced

WESTERN MACHINERY Co., San Francisco, Calif., has announced a completely new drum separator, designed to reduce the cost of multiple stage heavy-media separation. Because it greatly reduces the equipment needed to produce a middling product, this multiple drum separator is expected to have wide application in the cleaning of low grade coal and in the beneficiating of iron ores, the manufacturer claims. Other ores and minerals can also be handled.

In coal cleaning and ore beneficiating, the heavy-media separation process generally separates run-of-mine material into two parts, a float fraction lighter than the media and a sink fraction which is heavier than the media. Usually this is highly effective in separating desired material from waste. However, in low grade coal and ore, there may be present a substantial amount of "near gravity" material. Here it becomes desirable to obtain a middling fraction which can be crushed further and rerun to obtain additional recovery of mineral.

In order to obtain a middling product efficiently in the heavy-media separation process, two stages are required using heavy-media liquids of different gravities. A float product is produced on the lighter gravity media, a sink product in the heavier media, and a middling product between them. Heretofore, this has only been accomplished by using two separate drums or cones together with necessary screens, ductwork and attendant equipment. This is nearly equivalent to two complete heavy-media systems, and has made two-stage separation economically unfeasible in many instances.

The new Wemco process reduces the complexity of two-stage separation by using a partitioned drum with a lighter media in one section and a heavier media in the other. Material is passed from one section of the drum to the other, eliminating screens, conveyors and ductwork necessary when separate vessels are used. Only three conveyor systems leave the drum; they carry a true mineral product, a true waste product and a middling product. Recrushed portions of the middling product join the feed material and are returned to the drum.

"Cold Rubber" Used in Conveyor Belts

B. F. GOODRICH Co., Akron, Ohio, has announced that it is using "cold

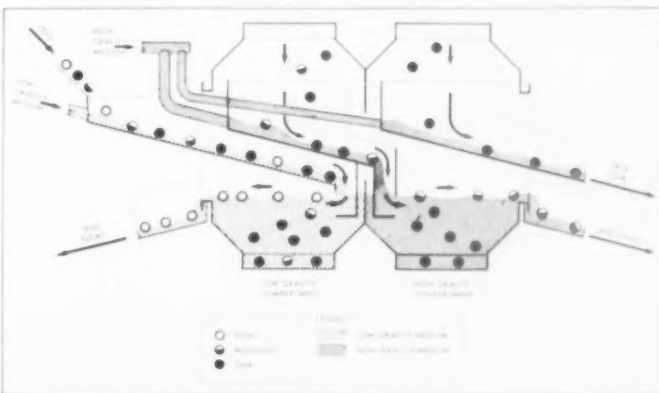
rubber" in some of the conveyor and elevator belts it manufactures. Methods have been found, the company says, to use the good qualities of the improved general purpose man-made rubbers, particularly those of higher resistance to abrasion, in certain flat belt services. "Cold rubber," when properly compounded for use in conveyor and elevator belts, should add from 10 to 25 percent more wear in certain applications, the company claims. This type of man-made rubber gets its popular designation as "cold rubber" because it is made at a temperature of 41 deg. F., whereas the older type of general purpose rubber is created at a temperature of 122 deg. F. The rubber is being produced in large amounts in rubber plants of the government, including the one at Port Neches, Texas, operated by R. F. Goodrich.

High-Strength V-Belts

GOODYEAR TIRE & RUBBER CO., Akron, Ohio, has brought out a new line of super-rated V-belts named "Hy-T," incorporating a chemically produced fiber. The synthetic cord has low stretch and good shock absorbing qualities, and is water and mildew resistant, the manufacturer claims.

Electric Chain Hoists

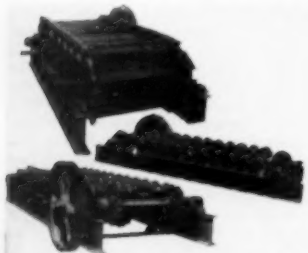
WHITING CORP., Harvey, Ill., has announced a complete, improved line of electric roller-chain hoists. The hoists use a spring-set, shoe-type motor brake, in which the lining is bonded to the shoe. This arrangement is said to provide improved braking power and longer brake life. The pull cord has been relocated at the center, instead of the end, of the hoist frame, to eliminate any tendency of the hoist to tip when the control cord is pulled, according to the company. The hoist control switch also is relocated and simplified and protected by a new switch mounting.



Multiple stage heavy-media separation accomplished in two compartment drum separator

Heavy-Duty Primary Feeder

PIONEER ENGINEERING WORKS, Minneapolis, Minn., has brought out the Pioneer-Oro Jumbo feeder, available in a 72-in. width and in lengths up to



Views of the 72-in. width heavy-duty pan feeder

60 ft. Feeder pans and all other wearing parts such as drive sprocket and supporting rollers are cast manganese steel.

According to the manufacturer, patented features include interlocking support points on the pans proper, and clean-out wedges in the pans link to remove dirt on the return side. Another feature claimed is the design of the pan which casts the drive links integral with the pan to eliminate bolts and rivets. Pans are cast with upturned lugs at the ends to form an interlocking continuous lip for reducing spillage.

The new feeder is an addition to the previously announced line of heavy-duty feeders beginning with the 36-in. width.

Vertical Turbine Pump Line

WORTHINGTON PUMP AND MACHINERY CO., HARTISON, N. J., has announced a new line of vertical turbine pumps available in capacities of 50 to 15,000 g.p.m. The manufacturer claims the



Vertical turbine pump head with motor drive and gear drive

new models develop maximum performance per size, and overlapping coverage allows selection of a unit for nearly any capacity and head condition at peak efficiency. The company also claims the following improvements: extra size bearings of special materials; shaft seals where required; enclosed impellers throughout; wearing rings; flanged and bolted bowl construction.

Either oil- or water-lubricated pumps are available, arranged for motor drive, right angle gear drive, or belt drive.

Non-Electric Magnet

FRIEZ MFG. CO., Erie, Penn., has introduced a group of non-electric Alnico plate magnets for separation of tramp iron from materials in process. Known as Atomagnets, they come in three models, each with a different magnetic strength: the "Extrapower," the "Ultrapower," and the "Superpower." Each also comes in a full range of sizes. According to the company the Atomagnets have greater magnetic strength than any other



Non-electric plate magnet

magnets comparable in size, type and cost, and are lightweight and streamlined in design.

Features listed include: magnet casting fully encased with a formed cover; parts riveted rather than bolted together; hinges made of aluminum, continuous and offset; insulation of the plate's working surface to confine magnetic strength to where it is desired, and a flush instead of recessed air gap on the plate face to prevent gathering of fine iron.

Roller Shafting

ALLIED STEEL PRODUCTS, INC., Cleveland, Ohio, has made a change in shafting to fit the Caterpillar D-8 rollers. The new shaft is produced by upset forging which forms the center flange in an unbroken grain making it stronger with less possibility of wear or cracking, according to the manufacturer. The shafts are made of special precision steel, heat treated, on all bearing surfaces by the induction method, thus minimizing the possibility of distortion, checking and cracking. The roller shafts are machined and ground to close tolerances to assure positive fit.

Electric Car Puller

KING MANUFACTURING CORP., Chicago, Ill., has introduced a new electric car puller available in five sizes, from two to ten horsepower and from



Car puller for horizontal or vertical mounting (shown here mounted vertically)

1500 to 6250 lb. line pull. Loaded freight cars at level grades can be moved 40 to 48 f.p.m. with the unit, the company states. Spools are five in. in diameter on the two horsepower unit and six in. in diameter on the other models.

The car pullers can be mounted vertically or horizontally, such as on the side of a building. All models have 220-440 volt, 3 phase, 60 cycle motors. Construction permits outdoor use the year around, according to the manufacturer.

Safety Soles

PENETRED CORP., Marshfield, Wis., has developed "Penetred" soles for sure footing. The soles incorporate the principle of wire claws inserted in rubber, such as used in truck tires, and are secured to work shoes with a special cement that accompanies each pair of soles. The soles are said to grip better as they wear, and are available in large and medium sizes.

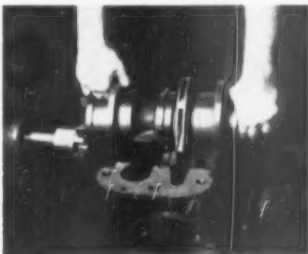


Rubber safety soles

New Design Reduces Pump Maintenance

DE LAVAL STEAM TURBINE CO., Trenton, N. J., has announced a new line of small standardized general service pumps. The line was designed with the idea of a service and exchange plan, according to the manufacturer. All parts except the bare pump casing are contained in the rotor assembly. When maintenance is necessary, the top cover is removed, the assembly lifted out and a new one dropped in place. The company maintains a service by which new rotors are available for immediate shipment. The old part is returned and credit given for all serviceable parts.

The pump is also of advantage for users operating well equipped maintenance shops. The casing is split



Pump rotor removed easily for maintenance

horizontally for easy access without breaking piping connections, and all parts are interchangeable.

According to the manufacturer, two other maintenance expenses were eliminated by the new design. Mechanical seals replace the stuffing box and prelubricated bearings in the pump are lubricated for life.

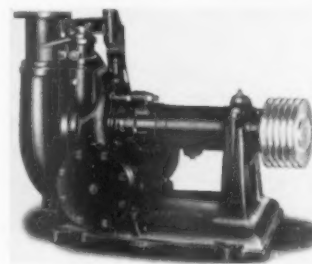
Compound Repairs Worn Conveyor Belts

MAGIC CHEMICAL CO., Brockton, Mass., has expanded distribution of its anti-abrasion plastic rubber compounds for protecting and repairing worn conveyor belts. The rubber and primer are applied to belt areas which are worn or damaged, exposing the duck carcass. The same material can be used to seal edges and rivet holes, the company states. It can also be used to coat valves, pipes and fittings and to line chutes.

Centrifugal Sand Pump

A. R. WILFLEY AND SONS, INC., Denver, Colo., has introduced its new model K centrifugal sand pump, said to embody many refinements in hydraulic design. One of the major mechanical improvements is a new check valve, giving better bearing protec-

tion, according to the manufacturer. A new discharge keeper registers on machine surfaces, providing accurate



Improved model of centrifugal sand pump

discharge piping alignment. Neither the intake or discharge piping need be disturbed during removal of pumping parts, it is claimed.

Permanent Magnets Redesigned

DINGS MAGNETIC SEPARATOR CO., Milwaukee, Wis., is now making available its non-electric Alnico Perma-Plate magnets in three magnet field ranges. Types 1, 2 and 3 magnets are designed for removing miscellaneous tramp iron from wet or dry materials. The manufacturer states that these units are more powerful and lighter in weight than previous models, and that each of these types is made in 19 standard sizes from 4 in. wide through 72 in. wide and in 2, 4, 6 and 8 pole sizes.

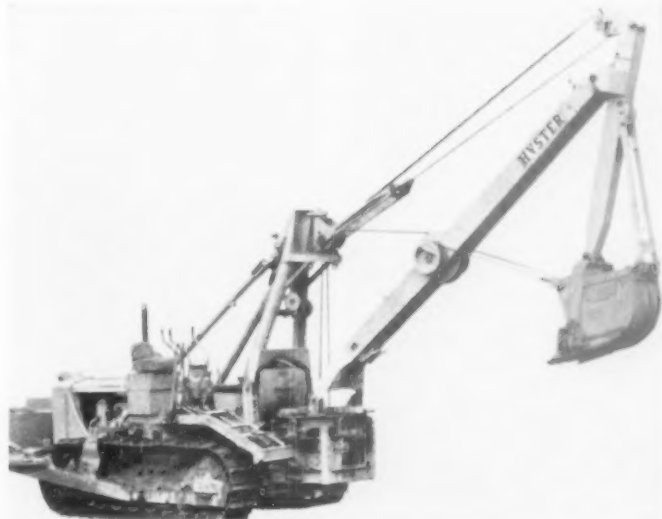
Mildew Inhibiting Agent

GOODYEAR TIRE AND RUBBER CO., Akron, Ohio, has announced addition of a mildew inhibiting agent to the materials used in production of V-belts, employed in transmission of power.

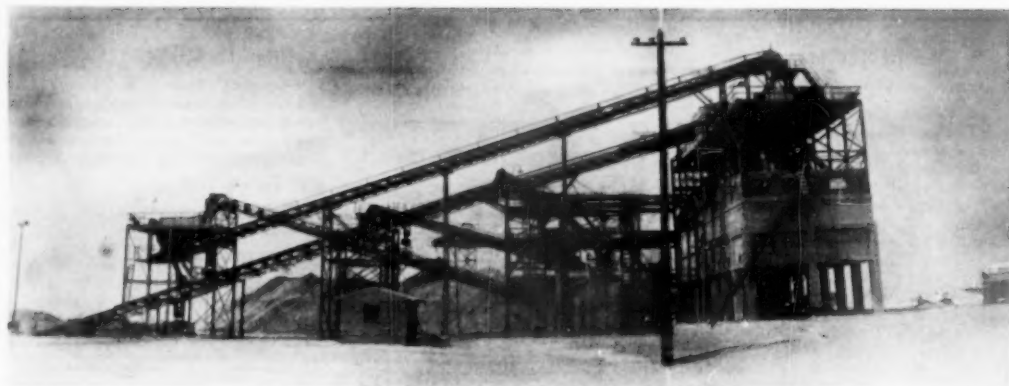
Tractor-Mounted Excavator

HYSTER CO., Portland, Ore., has announced its Hyster D6 Hystaway, a tractor-mounted $\frac{1}{2}$ -cu. yd. excavator, which may now be equipped with the hoe front previously available only for D7 and D8 Hystaways. Other variations manufactured for the D6 include interchangeable crane, dragline and clamshell fronts. The hoe front can be installed on either new or used Hystaways. Complete tractor mobility and maneuverability are retained with the attachment in place, the company claims. It also states that utility use of the dozer blade on the front of the tractor is still possible and it takes less than one hour to dismount the unit to permit full production bulldozer use.

The Hyster Hoe, according to the company, is characterized by fast swing and abundance of power. The hoe is claimed to be able to reach farther into the excavation than other conventional machines of the same size because the center of its swing is beyond the crawlers. Standard width of the hoe dipper is 33 in., but for narrow ditching requirements a 23 in. dipper is also available.



Tractor-mounted $\frac{1}{2}$ -cu. yd. excavator



Elevation view of the Azusa plant of Livingston Rock and Gravel Co., Inc.

Producing Washed Uncrushed Gravel And Unwashed Crushed Gravel

Livingston plant in southern California a modern example of production methods prevailing in area

CALIFORNIA is noted for its large capacity, efficient and well designed sand and gravel plants, and each year new additions to the productive capacity of the state are one phase of a general and steady growth in that area. This is particularly true of southern California, where one of the latest plants to go into operation is that of the Livingston Rock and Gravel Co., Inc., which has a new plant in the Azusa area. The new operation began in August of 1949.

One distinctive feature of California's nomenclature as applied to the

By WALTER B. LENHART

sand and gravel industry is the use of the word "rock" when describing some features of their operations. This is probably derived from the almost universal practice of separating the gravel portions into two separate and distinct classes; uncrushed gravel and crushed gravel. These two components are separated early in the processing set-up and are kept separate throughout the entire production

process. The crushing and processing of the larger pieces of gravel has probably led to the use of the word "rock," especially when referring to the crushed materials. The new plant of the Livingston Rock and Gravel Co. follows this general practice. The minus 1½-in. gravel, along with the accompanying sand, is processed wet in one section of the plant, and the crushed "rock" or crushed gravel is processed dry in the other part of the plant.

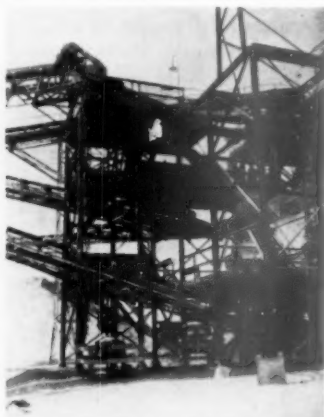
Southern California is noteworthy because a high percentage of the sand



Quarry trucks have specially designed body enabling dumping into slotted opening over crusher



Primary crusher is a 32- x 48-in. jaw crusher; above is truck roadway



Vibrating grizzly is at top; on next deck is a dry screen that removes minus 1½-in. material



New batching plant at Livingston's Artesia, Calif. plant



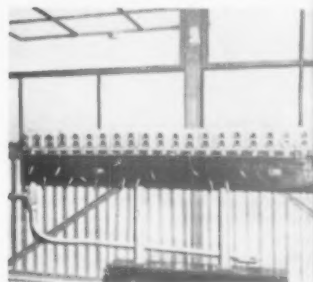
Loading pit-run material in quarry haulage truck



Another view of control house on top of plant; scalping screen is at lower right



Overflow from the sand drag goes to this pit where cranes from time to time remove the fine sand and store it on the rim



Control panel is located in house on top of bunkers. The push buttons have a locking device (small metal plate which slides in front of button) to prevent being turned on while equipment is under repair



Sand stacker belt is at left; bulldozer pushes the excess material back for increased drainage space



At left is the 4 1/4-ft. standard cone crusher; the 4-ft. short head is at right



Control house is at right. In center is visible one of two parallel vibrating screens with dust covers



View from one window of the operator's station on top of the bunkers. At left is the scalping screen and at right is the dry covered reject screen which receives crushed gravel from both cone crushers, returning oversize to the scalper



Some of the company trucks lined up at the end of the day

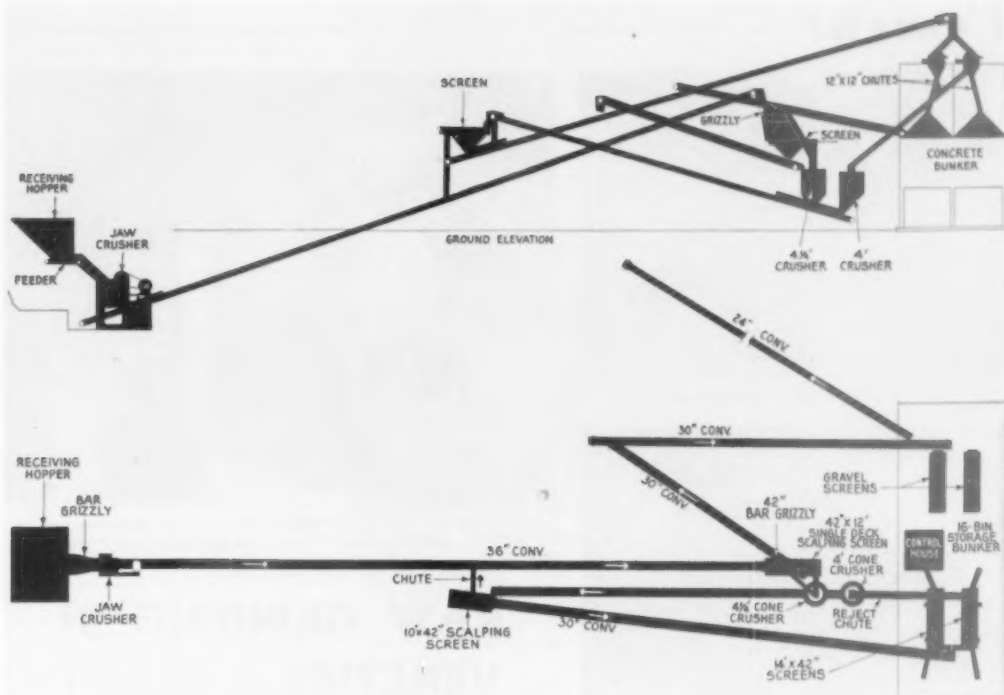
and gravel is shipped by trucks, and these trucks are, for the most part, company owned. In southern California, alone, according to one authority, there are over 1000 dump trucks, some with trailers that are owned and operated by the producing companies. It appears to be general practice for the producer to have sufficient truck capacity to haul from 70 to 75 percent of the total sales in company-owned vehicles. These percentages are based on the higher sales volumes, the idea being that if a slump does come, the contract haulers may have to take a cut, thus keeping the company-owned fleet operating on a high and efficient basis. In general the trucks are of large capacity. The new operation at Azusa of the Livingston Rock and Gravel Co. follows this general pattern, for a large fleet of trucks, rear-dump, telescope-dump and bottom-dump types are used, and practically all of the plant's output goes out on rubber tires; however, the plant is alongside the Santa Fe railroad and provisions have been made to ship by rail if and when desirable. The trucks are neat and clean and have the company's name prominently displayed.

Where a large part of the deliveries are by truck, scales of adequate dimensions to weigh both the truck and trailer at one setting are required. The maximum wheel base allowable in California from front axle of tractor to rear axle of the trailer is 56 ft., so the designers of the new plant have provided a pair of Webb scales with a 75-ft. platform for truck weighing.

The company has a second large operation near San Pedro, Calif. This operation was described in the September, 1949, issue of *Rock Products*. It is a crushed stone operation and the source of rock is a site in the Palos Verde Hills overlooking the Pacific Ocean. The company also has ready-mixed concrete operations in southern California, but at time of inspection of the new plant at Azusa there were no facilities provided for its manufacture.

Gravel Bearing Areas

The sand and gravel producing sections of southern California are concentrated in two areas: the northern area might be called the Roscoe section, and Azusa the southern production section. However, there are other major production centers in the Ventura, Bakersfield, Riverside, San Bernardino and San Diego sections. Azusa is about 20 miles east of Los Angeles on the Foot Hill Boulevard that connects Los Angeles with San Bernardino. Here the gravel deposits that spread out from the San Gabriel "wash" are of excellent grade and cover wide areas, with the gravel extending to considerable depths. Most of the pits stop digging at the water table, but this is often more than 150 ft. The new plant here is processing this same type of material, and the



Plan and elevation flow diagrams of the Azusa plant

depths so far attained are in the 25 to 35 ft. range.

Primary digging is done by a 2½-cu. yd. Northwest shovel that loads to a fleet of three Diamond "T" trucks, each of which hauls an 18 to 20 ton pay load. The trucks are rear dump and the body has been especially designed; the rear end of the body has been fabricated to make a chute-like opening that is slightly narrower than the width of the truck's body. Thus when the truck arrives at the hopper over the primary crusher, the truck passes over a long slot-like opening into which the truck dumps. The design of the truck body is such that the truck can dump rapidly and practically no spill falls to the passageways used by the tires. The illustration will give a good idea of how these trucks unload. The haul to the plant is a matter of a few hundred yards up easy grades. Since the trucks make a loop to the crusher house, no backing-up is necessary to unload.

The plant uses belt conveyors throughout. There is a total of six belt conveyors in the plant.

Sand Production

Only one sand is produced—concrete sand, and this is the minus ¼-in. material that is processed in a company-made sand drag. A large stockpile is kept of this material, and as the pile grows the excess is pushed

back by a RD-7 "Caterpillar" dozer. This procedure gives ample time for the sand to drain to a reasonable water content. The overflow from the sand drag flows to a rectangular dirt pit where the fines settle. These are recovered by clamshell to ground storage on the rim of this pit by one of two Northwest cranes. These same units are also used about the plant for reclaiming other sizes of crushed rock and gravel.

The new plant has a capacity of 350 t.p.h. but has handled 3000 tons in 8 hr. The conveyors were all made by Barber-Greene Co. The first belt in the plant from the primary crusher is 36-in.; all the rest are 30 in. with the exception of the stacker belt for sand which is a 24-in. belt. It is noteworthy that the No. 1 belt from the primary crusher has no walkway alongside it.

Primary Crushing

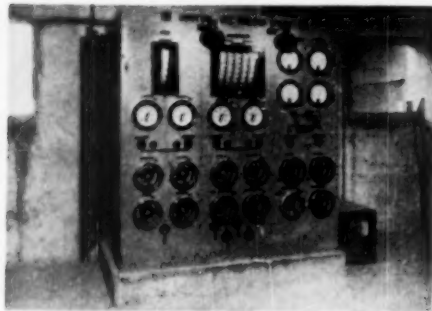
Primary crushing is done by a 32 x 48-in. Cedarapids jaw crusher that is fed by an apron feeder placed under the steel hopper into which the trucks unload. One operator is kept at this station. Secondary crushing is by two Symons cone crushers, a 4¼-ft. standard head and a 4-ft. short head. All of the conveyor galleries and secondary crushing structures are of heavy steel construction. The general appearance of the plant while operating is quite pleasing, one reason being that

the dry screens are all enclosed in a dustproof enclosure that covers the screening part of the units only. These keep the dust well under control, and we were able to take all photographs while the plant was in operation, as dust did not interfere in the least. The bins, 16 in number, are of reinforced concrete construction; each holds 80 tons. Plant design was carried out by Caldwell & Mason of Long Beach, Calif., under the direction of Carder Livingston, president of Livingston Rock and Gravel Co., assisted by Jim Worthington, general superintendent.

There is a total of seven vibrating screens which includes the primary scalper-grizzly. The scalper is a vibrating Symons grizzly, 4 x 12-ft. dry, which scalps out the plus 3-in. gravel. This rock is chuted to the 4¼-ft Symons standard crusher. The undersize from the scalper falls to a 4 x 14-ft. Symons dry, single-deck preliminary screen that separates the gravel, or uncrushed, portion from that part which is to be crushed later. The split here is on a 1½-in. opening. All the minus material falls to an inclined cross belt that unloads at a terminal tower to a second inclined belt. This delivers the straight gravel to one of two 4 x 14-ft., 2½-deck wet Symons screens that are mounted over the concrete bins where the final sizing

(Continued on page 98)

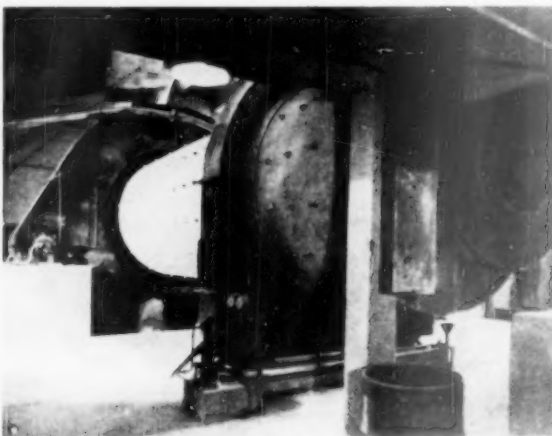
Cement



Centralized control panel for air-swept mill system



Circulating fan and insulated ducts; pump at the right transports ground raw material to the correcting tanks



Grinding mill, 8½ x 27 ft., seen from the inlet end; slide shoe bearing is visible in center, and gear guard for master gear and pinion is in background

RAW GRINDING IN VENEZUELA PLANT

Dry process plant has been extensively modernized and uses air-swept mill for grinding limestone

By V. A. AAGAARD*

COMPANIA ANONIMA FABRICA NACIONAL DE CEMENTOS in Caracas, Venezuela, is one of the oldest and most progressive cement companies in South America. The plant, operating with a dry process operation, is located at La Vega on the outskirts of Caracas. The company was founded in 1907 and started operation in 1909, essentially with one shaft kiln, a crusher and a ball mill. Small rotary kilns were installed in 1912, 1915 and 1930, bringing the daily output to about 120 short tons or 650 bbl. of cement.

Modernization Program

In 1930 the clinker grinding department was modernized by the installation of a No. 2011 Unidan mill, 7 x 36 ft. The results obtained with this mill opened the way for further enlargement, and a complete modernization and increase of the plant were completed before World War II.

The first Unax kiln was started in

1940 with a daily capacity of 275 short tons. The raw grinding installation consisted of a No. 2488 Unidan mill, 8 x 29 ft., equipped with a drying compartment through which hot air could be drawn. Another No. 2011 Unidan mill for clinker grinding was also installed.

A further expansion of the plant was undertaken right after the war when a Unax kiln, 9 ft. x 10 ft. 6 in. x 325 ft., designed for 300 tons capacity, was installed. The new raw mill then installed is an air-swept No. 2681 Tirax mill, which is 8½ ft. in diameter by 27 ft. overall length.

Limestone Quality

The raw materials at Caracas consist of a high grade limestone "Azul," and a low grade limestone "Ripio," which are proportioned and blended to produce the raw mix. No correction materials are used. The "Azul" is a crystalline limestone with about 80 to 84 percent calcium carbonate, whereas the "Ripio" is a low-grade limestone of a softer character and containing some clay. Its calcium car-

bonate content is about 60 percent. The raw mix is usually kept at a titration of 77.5 percent total carbonates. The raw materials are extremely un-plastic but are particularly easy to burn, almost like natural cement rock, which makes it possible to burn raw mix with a low fineness, corresponding to only 76 to 80 percent passing a 200-sieve, in producing cement that will pass ASTM specifications.

The crushed high and low carbonate limestones are deposited in separate feed bins by an overhead traveling crane, and table feeders of a modern, enclosed type proportion them to the No. 2681 Tirax mill. The mill is driven by a 760-hp., 735-r.p.m. motor through a speed reducer, pinion and master gear.

Grinding Raw Materials

The mill has a slide-shoe bearing near the inlet end with the tire mounted on the mill shell. This eliminates the inlet trunnion and permits a very convenient arrangement for the feeding of material and the entrance

*Technical Director, Compania Anonima Fabrica Nacional de Cementos, Caracas, Venezuela

of drying air to the mill. The drying is accomplished by sweeping the mill with hot air, but during the dry season it is possible to operate the mill with unpreheated air, relying only on the heat developed by the grinding. Usually the moisture in the mill feed is below 4 percent, but occasionally it may go up to 8 percent. An oil-fired furnace is provided for supplying hot air to the mill when required.

Besides effecting the drying, the air sweeping through the mill carries the ground particles out of the mill as they are produced to an FLS air separator, located above the mill discharge end. The stream enters the bottom of the separator and is given a cyclone-like upward movement. A rotary system of deflector plates rejects the oversize particles which are returned to the mill by gravity. The finished product is carried further by the air to a cyclone where the material is precipitated.

The main circulating fan is located immediately beyond the cyclone and part of the air is recirculated to the mill and separator system, while a fraction is drawn through a Sly dust filter by a secondary fan. The fans are so dimensioned that the entire system is under suction; therefore, the mill room remains free of dust and is easy to keep clean.

The operation of the Tirax mill system has proved to be very simple. The fineness of the product is closely controlled by regulating the separator speed, and it has been found that the fineness can be increased easily, without reducing the output appreciably, simply by increasing the circulating load. The control of the mill feed and of the various dampers for the air to the mill and separator, as well as the amount of hot air from the furnace and the moist air to the filter, are regulated from a central control panel, on which are also located stop and start handles, and draft and temperature control instruments.

Power Consumption

The mill was intended for an output of 40 short tons per hour; actually it is producing more than 50 t.p.h. The total power consumption for the mill, separator and fan installation is less than 1000 hp., giving an overall power requirement of less than 5 kw.-hr. per bbl., which means about 30 percent in power saving compared with the open circuit grinding employed previously.

The finished raw material is discharged from the cyclone to a Fluxo pump which pneumatically transports it to the correction silos and the blending tanks in which the blending is performed by aeration and mechanical agitation.

All the installations were designed by F. L. Smidth & Co., which also furnished all the machinery and accessories.



Two enclosed feed tables with drive installed above inlet to mill

The quality of the cement made at the plant is illustrated by the following average for one month operation:

Surface area, 1600 sq.cm./gr.

Setting time:

Initial: 3 hr. 00 min.

Final: 4 hr. 50 min.

Tensile strength:

1 day: 170 p.s.i.

3 days: 315 p.s.i.

7 days: 422 p.s.i.

28 days: 502 p.s.i.

Autoclave Expansion, 110 percent.

C. A. Fabrica Nacional de Cementos

is presently producing some 550 metric tons (3300 bbl.) of portland cement per day, which is sold almost exclusively in the city of Caracas, where, at present, a large building and street construction program is under way.

Dr. Carlos H. Maury is president of the company and Ladislao Caballero is manager. Dr. Gustavo Delfino is vice-president and Juan Delfino is director, the latter also being plant manager. The plant operation is under the direction of V. A. Aagaard.

World-Wide Cement Developments

IN AUSTRIA cement production and demand increased sharply in 1949 over 1948. Total Austrian cement production reached an all-time high of 1,091,012 metric tons, almost three times the 1937 level.

The necessary raw materials are supplied from domestic properties, which are largely owned by the cement companies. Slag is obtained from the United Iron & Steel Works in Linz, Upper Austria, and limestone from Ebensee, Alpine Montangesellschaft for use in the Peggauer Zement- und Schotterwerke in Peggau. Raw materials are adequate for capacity production.

Domestic demand for cement in 1949 was about 20 percent higher than production. The apparent discrepancy in production and consumption for 1949 can be explained by the fact that certain quantities of cement had to be exported to obtain needed spare parts for machinery. The result of heavy

demand is that there are no stocks of any importance. Greater storage facilities are a real necessity especially during the winter months. At present, available storage facilities are inadequate for more than one month's stockpiling.

Austria exports only a small quantity of cement. In 1949, 5049 tons were exported (excluding cement bartered for spare parts from Germany), compared with 3503 tons exported in 1948 and 14,696 tons in 1947. Italy was Austria's largest buyer. No exports are anticipated for 1950, but if no foreign exchange is made available to cement plants for the purchase of spare parts, certain quantities of cement may be bartered in individual transactions by cement firms against cement-producing machinery.

In the first 10 months of 1949, imports of cement totaled 5046 metric tons, compared with 1531 in 1937, 7.8 tons in 1947, and 1418.6 tons in 1948.

Crushing Practice and Theory

Part IV. Gyratory crusher concaves

By BROWNELL MCGREW*

THE PREVIOUS ARTICLE (October issue) Fig. 2 illustrated the cross section of a typical gyratory crusher. Fig. 3 illustrates the same crushing chamber we have been considering, except that, in place of the straight-face concave, the non-choking type has been substituted. For the sake of direct comparison we have shown the same discharge setting in both diagrams, although a closer setting would be permissible for the non-choking arrangement.

Inasmuch as the eccentric-throw is the same, and the concaves in the upper part of the chamber parallel those of the standard type, it follows that the successive drops of the material in this zone would be similar. This is true down to line 13. Then we note a difference in the new diagram; the drop per stroke increases much more rapidly than in the former case until, at stroke 16, the line has arrived at the discharge level.

The choke-point has been raised to point 13-14, instead of being at the discharge level. From the choke-point, on down to the discharge level, each successive volume is greater than volume 13-14, and greater than the volume immediately preceding. Therefore, the shape of the crushing chamber in the zone below the choke-point is favorable to choke-free operation. Under certain conditions choking can occur in this zone, however, as will be pointed out later.

The ratio-of-volume-reduction between volumes 0-1 and 18-19 in the figure previously discussed is obviously greater than the ratio between volumes 0-1 and 12-14 in the non-choking diagram; actually the ratio in the former case is about 4:1, and in the latter about 1.75:1. Therefore, if we assume an equal percentage of voids in the feed for both cases, it is apparent that the non-choking arrangement will not, when the choke-point is reached, have compacted the material to as low a percentage of voids as the straight-face chamber. Also, the actual volume of 18-19, in the standard chamber, is substantially smaller than that of 13-14 in the non-choking chamber. Inasmuch as these volumes pass the choke-point in the same time-period, the capacity through

the 13-14 zone is obviously the greater of the two.

These two facts account for the superior performance of the standard gyratory—and the standard jaw—crusher when fitted with non-choking liners. As compared with the straight-face concaves, the salient features of the non-choking variety are:

(1) They permit the use of smaller discharge settings in any given size of crusher.

(2) Capacities are considerably higher, particularly so in the range of finer settings.

(3) Wear of crushing head and concaves is more evenly distributed in the lower part of the crushing chamber.

(4) The receiving opening is reduced, the amount of this reduction depending upon the crusher setting, and upon the degree of curvature of the concave faces.

(5) The ratio-of-reduction in the different sizes of standard crushers varies from about 6.75 to 9.5, averaging about 7.9 for the sizes mentioned previously. This is also based upon the use of standard-throw eccentrics.

(6) The crusher product is more uniform, and will generally contain less fine material.

(7) Power requirements are very definitely in favor of the non-choking concaves.

It is obvious that this type of concave has some very desirable features. As a matter of fact, the development of scientifically designed, curved profile crushing surfaces is probably the most important single improvement ever made in pressure-type crushers. The relative performance of non-choking concaves in the standard gyratory crushers is graphically illustrated in Table I. This table contains a complete list of capacity ratings for Superior McCully crushers, from 8 to 42 in. inclusive, for straight-face, and non-choking, concaves.

This table also lists "Modified Straight Concaves." These are concaves having a lesser curve at the bottom partly approaching the non-choking concaves but having the choke-point at the bottom of the chamber. They are used where the open-side setting is large enough to permit the use of straight concaves, but where some of the advantages of non-choking concaves are desired. These include increased capacity, more uniform sizing and the distribution of wear to prevent "bell" of the head.

It should be made clear at this point that these concaves, although they bear the title of "non-choking," do not afford absolute insurance against choking. In that respect the title is perhaps a trifle misleading. The very fact that a choke-point exists at all within the crushing chamber makes it evident that choking can occur. On the other hand, they do minimize the danger of choking, and their general characteristics are such that their descriptive title is not too far afield.

Character of Product

Among the salient features of the non-choking concave, we mentioned the character of the product. So far we have been dealing with crushers whose eccentric speeds are low enough to permit the material to fall, with each receding stroke of the active crushing member, the full distance allowed by the close- and open-side physical proportions of the crushing chamber, regardless of the shape of the concaves. In such crushers, the maximum one-way dimension of product particles is governed by the open-side discharge setting; therefore it is cus-

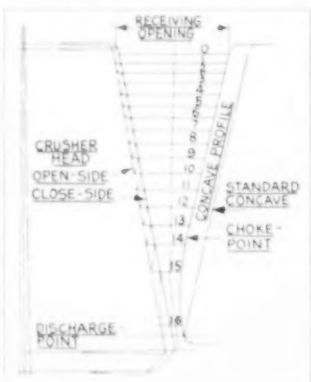


Fig. 3. Standard gyratory with non-choking concave

*Allis-Chalmers Manufacturing Co., Los Angeles, Calif., district office.

tomy to predicate both product and capacity upon that setting. Actually, the sizing is done by the closing stroke of the crusher on the material in the zone just above the discharge opening; in other words, upon that material which will be discharged during the next opening stroke. It follows that the shape of the chamber immediately above the discharge opening must have some influence upon the product gradation, and we should expect that non-choking concaves, by virtue of the smaller angle they afford between head and concaves in the discharge zone, would make a more uniform—and somewhat finer—product than straight concaves. This is true, and it is an important and favorable feature of these concaves, particularly so as applied to the production of commercial crushed stone.

One more word about the character of product. As the percentage of voids decreases in the crushing chamber, the amount of very fine material produced at each stroke is apt to increase, due to the crushing of particles against each other as they become more and more closely packed. Therefore the ratio-of-volume-reduction has a definite influence upon the amount of fines in the crusher product. This is especially true of friable materials. On such materials the substitution of non-choking concaves for those of the conventional type will usually result in marked decrease in the percentage of extremely fine material in the crusher product.

From the standpoint of power consumption, the best machine is the one that does the least amount of unnecessary work. A certain amount of non-productive work is expended by any pressure-type crusher in "pushing around" material which is already small enough to pass the discharge opening but which is prevented from doing so because the particles are trapped in the surrounding body of material.

As the percentage of voids decreases the number of such trapped particles increases, the amount of non-productive work likewise increases, and the material becomes harder to move as it becomes more compacted. Actually, there is some work being accomplished on this small material which might properly be classed as productive work; but, from the viewpoint of the commercial crushed stone producer at least, it is undesirable work; the attritional production of fines, mentioned in the preceding paragraph. The clean-breaking crusher is the economical crusher, both from the standpoint of power consumption, and general wear and tear. And, because the non-choking concaves make for cleaner breaking, they benefit the crusher in both of these respects. At comparable discharge settings the power saving may run as high as 20 percent. (The next article in this series will discuss Gyrotary Reduction (secondary) Crushers.)



Forty-two inch cone crusher installed at Marble Cliff Quarry

STRAIGHT CONCAVES

SIZE OF CRUSHER INCHES	TWO FEED OPENING APPROX. SIZE OF EACH	COUNTER SHAFT SPEED R.P.M.	APPROX. H.P. REQUIRED	APPROX. NET WEIGHT POUNDS	OPEN SIDE SETTING IN INCHES AT DISCHARGE POINT										
					1/4	1/2	3/4	1	1 1/4	1 1/2	2	3	4	5	6
14R	2 1/2 x 11	700	2	700											
8	8 1/2 x 35	450	15.25	20,000	35	40	45	47							
10	10 1/2 x 44	400	25.40	30,000	40	50	60								
13	13 1/2 x 44	375	50.75	45,000	65	100	130	135							
16	16 1/2 x 60	350	60.100	62,000					130	140	210				
20	20 x 80	325	75.125	84,000							200	210	285		
30	30 x 98	325	125.175	148,000								310	340	390	
42	42 x 143	300	200.375	284,000									500	570	630
54	54 x 170	250	325.500	450,000										670	730
60	59 1/2 x 190	250	325.500	725,000											850
80 SPEC.	59 1/2 x 195	250	300.900	1,000,000											1,000

MODIFIED STRAIGHT CONCAVES

SIZE OF CRUSHER INCHES	TWO FEED OPENING APPROX. SIZE OF EACH	COUNTER SHAFT SPEED R.P.M.	APPROX. H.P. REQUIRED	APPROX. NET WEIGHT POUNDS	OPEN SIDE SETTING IN INCHES AT DISCHARGE POINT										
					1/4	1/2	3/4	1	1 1/4	1 1/2	2	3	4	5	6
8	8 x 35	450	15.25	20,000	35	40	45	47							
10	10 x 44	400	25.40	30,000	40	50	60								
13	13 x 44	375	50.75	45,000	65	100	130	135							
16	16 x 60	350	60.100	62,000					130	140	210				
20	20 x 80	325	75.125	84,000							200	210	285		
30	30 x 98	325	125.175	148,000								340	370	400	
42	42 x 143	300	200.375	284,000									600	630	690

NON-CHOKING CONCAVES

SIZE OF CRUSHER INCHES	TWO FEED OPENING APPROX. SIZE OF EACH	COUNTER SHAFT SPEED R.P.M.	APPROX. H.P. REQUIRED	APPROX. NET WEIGHT POUNDS	OPEN SIDE SETTING IN INCHES AT DISCHARGE POINT										
					1/4	1/2	3/4	1	1 1/4	1 1/2	2	3	4	5	6
LABORATORY	2 1/2 x 11	700	2	700											
8	8 x 35	450	15.25	20,000	35	40	45	47							
10	10 x 44	400	25.40	30,000	40	50	60								
13	13 x 44	375	50.75	45,000	65	100	130	135							
16	16 x 60	350	60.100	62,000					130	140	210				
20	20 x 80	325	75.125	84,000							200	210	285		
30	30 x 98	325	125.175	148,000								340	370	400	
42	42 x 143	300	200.375	284,000									600	630	690

Table 1: Crusher capacities, based on full continuous feed of quarry or mine-run material weighing 100 lb. per cu. ft. crushed



Sun Valley Lodge, Idaho, where directors' meetings were held

Directors of National Sand and Gravel and National Ready Mixed Concrete Association aim to please all

Convention Programs Discussed

THE CARE WITH WHICH the programs are prepared for the annual conventions of the National Sand and Gravel and National Ready Mixed Concrete Associations was well illustrated in the joint meeting of the Boards of Directors of the associations at Sun Valley Lodge, Idaho, Sept. 27. This meeting was preceded by the separate board meetings, and subjects of joint interest only were discussed. Chief of these was a general survey of convention activities, with special emphasis on the kind of program most to be desired. This has become a regular feature of the mid-season board meetings, and is evidence of the meticulous care the Washington officers take to be sure they are in line with the majority opinion in the industry.

V. P. Ahearn, executive secretary, had sent letters to all the directors soon after the 1950 convention, and these were summarized. No radical changes were proposed. There was considerable opinion that the Manufacturers Division cocktail party and

reception was becoming too big and unwieldy to accomplish its objective, and suggestions were made for some other form of entertainment.

One quotation from Mr. Ahearn's summary needs thoughtful attention by the officers of all such industry groups, because, at least in the case of those industries we are best acquainted with, we believe it is a generally held view. He said: "Our group holds a strong reservation about what might be called 'outside speakers.' They like informality in their convention programs. They get a great kick out of seeing men of the industry, and particularly the younger men, on the program, discussing important problems of the industry and showing, incidentally, that we have some fine public-speaking talent. Our Chicago convention proved that we do have men in our industry who know how to express themselves in public, and are capable of helping other producers overcome the problems which our industry faces. The board apparently

prefers to continue emphasizing informality in the business program, drawing upon our own personnel for leading the discussions."

New Orleans Next

The 1951 conventions of the two associations will be at New Orleans, La., February 10-15. This is the week following the famous Mardi Gras. The headquarters of the convention will be the Roosevelt Hotel, but several other first-class hotels are available to take care of the delegates. Since the accommodations at the Roosevelt are limited it is proposed to consider giving preference first to officers, directors and their families; next to active (producer) members of the associations. This has never been necessary before, but all agreed that since some method of prorotation was necessary, this was as fair as could be worked out.

According to a tentative program, the convention will open with a meeting of the Executive Committee of the



Stanton Walker, director of engineering and research, reports



Work done, Eastern delegates stretch their legs at Green River, Wyo., on way home

National Sand and Gravel Association in the morning on February 10 (Saturday), and of the Executive Committee of the National Ready Mixed Concrete Association in the afternoon. On February 11 there will be a trip to the Jahnke family estate, some miles north of the city for the members of the two boards and their ladies. February 12 will be occupied by meetings of the two Boards of Directors. The convention proper will open February 13 with a joint session of the two associations, in the morning, and a session of the National Sand and Gravel Association in the afternoon. On February 14 there will be a joint session in the morning and a National Ready Mixed Concrete Association session in the afternoon, with a joint luncheon in between. The closing session of the National Sand and

Gravel Association will be the morning of February 15, and the closing session of the National Ready Mixed Concrete Association in the afternoon.

This program is arranged so that those who do not feel duty bound to go to the sessions of both groups can find time to see something of the convention city.

Other Business

Most of the rest of the joint meeting of the two boards at Sun Valley was occupied by talks on the present Washington scene by V. P. Ahearn and on research by Stanton Walker. The mid-year board meetings next year, 1951, will be held in Washington, D. C., which will give the members an opportunity to see the new laboratory facilities at the University of Maryland.

urance plan especially designed to help the smaller operators get the benefits of large group rates; and the constant need for vigilance in safety work, or accident prevention. Robert Mitchell, reporting for the Safety Committee, said the industry was well represented in the current contest for safety trophies. He said it was interesting proof of the real interest of top executives that all three winners of the 1949 trophies had representatives on the association's Board of Directors. These prize winners were announced and their names and records will be found in a news item on page 49 of this issue.

Alfred H. Smith, a Maryland producer, described his experience in operating under a new state law forbidding pollution of streams by the wash waters of sand and gravel and other industrial operations. The association has a working committee on problems of stream pollution, zoning and land rehabilitation, and Mr. Smith was the committee's representative at the meeting.

FIFTY YEARS A PRODUCER

Directors of National Sand and Gravel Association honor F. D. Coppock

A PLEASANT AND INTERESTING feature of the annual fall meeting of the Board of Directors of the National Sand and Gravel Association at Sun Valley Lodge, Idaho, September 26, was the election by unanimous vote of Fred D. Coppock, president of the American Aggregates Corp., Greenville, Ohio, an honorary life member of the board. The resolution honoring Mr. Coppock is published elsewhere in this issue in the Personal News columns. Robert Mitchell, past-president, introduced the resolution, as he has done in the case of the two previous honorary members of the Board—Nathan C. Rockwood and Eric W. Ryberg.

Present at the meeting was every member of the executive committee and 20 of the 37 members of the Board, and five of the 14 living past-presidents, who are ex-officio members. Also present were several guests, including directors of the National Ready Mixed Concrete Association, who held one joint session with the directors of the National Sand and Gravel Association.

Continued Growth

Following a brief introductory address by Harris N. Snyder, president and chairman of the board, in which he emphasized the critical times, V. P. Ahearn, executive secretary reported on a very healthful financial condition for the association. Since the Chicago convention last winter the association has gained 11 new members, making the active membership to date 197 producing companies. There are also 71 associate members—largely machinery and equipment manufacturers.

During the current year there have been numerous regional meetings, ad-

dressed either by the executive secretary or the engineering director and organized by local members of the board. These have been highly successful in taking the association and its work to the industry, especially to those producers who find it impossible to attend all the conventions. Mr. Ahearn gave credit to the members of the board for the growth in membership of the association.

Industry Problems

J. Rutledge Hill, past-president, reporting for the committee on taxation, for which he did yeoman work at congressional committee hearings, told of the success of the industry in establishing the right to a percentage depletion as a cost item, only to see it discarded in the critical tax situation brought about by the Korean war. He was optimistic, however, in regard to future tax laws, when the present crisis is over.

Morgan R. Butler, representing the Manufacturers Division, expressed appreciation for the interest and support that the manufacturers of machinery and equipment received at the Chicago convention exhibit last winter. He suggested the possibility of getting all the mineral aggregate associations to hold their conventions in the same city during the same week (at different hotels, if necessary) so that the manufacturers could hold a single joint exhibit in some appropriate place accessible from all the hotels. Only thus, it is believed, can these exhibits be made larger and more interesting.

V. P. Ahearn was not optimistic about railway car supply, that is, gondola cars. He said they would probably be in short supply for another two years. Other subjects he discussed in some detail were a group life in-

Engineering—Research

Stanton Walker, director of engineering and research, described an American Concrete Institute project for a symposium on aggregate production. He said the Korean war was interfering with his finding a suitable candidate for the Association Fellowship at the University of Maryland. He also brought up here, as he did at the National Ready Mixed Concrete Association Directors' meeting, the advisability of inviting representative members of the Manufacturers Division to read papers at the annual conventions. Mr. Walker did not go into detail on his research work, for the entire membership is kept posted on the progress of this at regular intervals, the latest report being September 8, 1950.

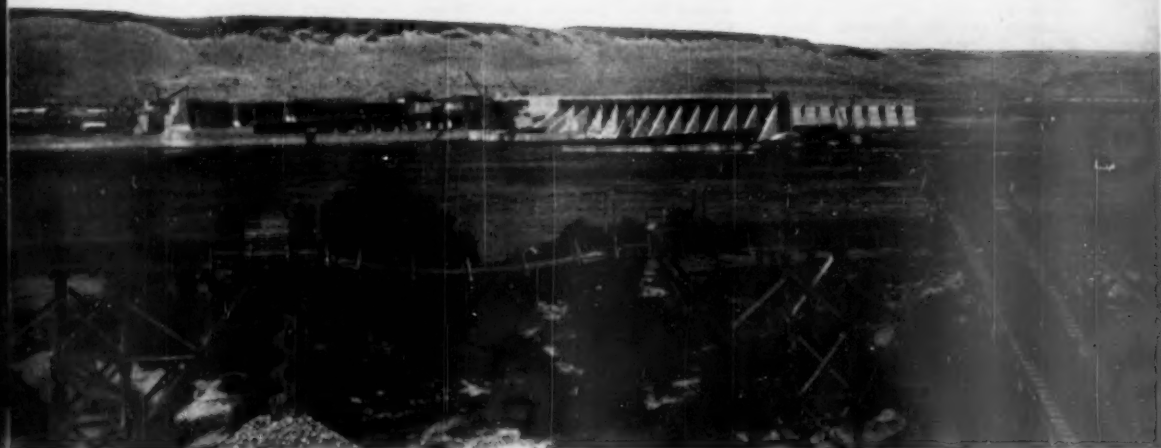
Registration

The following list of those registered includes wives, children and guests (alphabetically arranged):

R. H. Baker, Chattanooga, Tenn.; Mrs. Charles Ball, Detroit, Mich.; R. S. Barneyback, wife and daughter, Oakland, Calif.; Mrs. Jean Becker, Detroit, Mich.; F. E. Bellamy and wife, Cedar Rapids, Iowa; H. D. Bellamy, Cedar Rapids, Iowa; W. A. Bliss, Pittsburgh, Penn.; Eugene R. Booker and wife, San Francisco, Calif.; E. F. Brovelli and wife, Napa, Calif.; Henry J. Brown and wife, Oshkosh, Wis.; J. A. Bullen and wife, Pueblo, Colo.; Morgan R. Butler and wife, Waukegan, Wis.; H. P. Caldwell and wife, Louisville, Ky.; R. C. Collins and wife, Philadelphia, Penn.; Otto S. Conrades and wife, St. Louis, Mo.; C. S. Dickson and wife, Wheeling, W. Va.; J. B. Donovan and wife, Springfield, Mass.; W. J. Doyle, Jr., and wife, Tulsa, Okla.; Alex. Foster, Jr., and wife, Philadelphia, Penn.;

(Continued on page 66)

AGGREGATES



Construction view of McNary dam showing completed work on the Washington side; locks in background will be largest single-lift type in world

Producing GRAVEL for McNary Dam

**Sand gradation controlled through operation
of hindered settling classifiers, fractionating
particle sizes for accurate recombination**

MCNARY DAM, now under construction on the Columbia river, is one of the largest single pieces of construction going on in the United States today. It is so big it cannot be comprehended in a single glance. To see it all from any one vantage point, the eye is so far away, and the surroundings so far flung, that the dam situated in the seemingly shallow basin is dwarfed by the broad and massive setting.

The great plateau of the Columbia river basin is one of the great geological events of all history. Vast amounts of fluid lava poured out from unknown and unnamed vents in the earth's surface, and flow upon flow of lava buried thousands of square miles of country—eastern Washington, most of Oregon and Idaho. In some places, depth of the lava flows was 5000 ft. It takes days to cross it at high road speeds and every valley through it is a valley between steep gorge-like rims, the edges of which are built up, step-by-step, by these layers of dark colored basalt.

The dam structure being built near Umatilla, Ore., represents an investment of some \$227,000,000; the lock on the Washington side is the largest

By **WALTER B. LENHART**

single-lift lock in the world; the salmon fish ladders to be built on both sides of the dam are the largest and the most carefully planned of any in the world, and the dam itself will be 7400 ft. long and will generate 980,000 kilowatts.

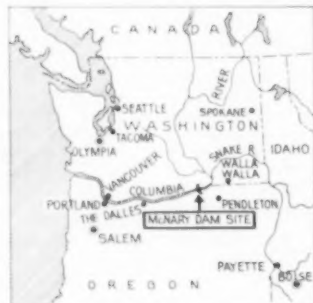
With this type of an introduction to an inspection of the project, it is

not hard to visualize the comparative ease with which water from the Columbia can be diverted to the desert sections of Nevada or California. Canals a thousand miles long do not seem out of proportion. A little more northerly there is already under construction a series of canals almost five hundred miles long—big canals—as big as the All-American canal in southern California.

It is probably not too important, as far as aggregates are concerned, to understand fully the series of geological events that produced this section of the Northwest. However, it is fortunate that from it has evolved aggregates highly suitable for such great projects as McNary Dam.

Gravel Characteristics

The basaltic river gravels that came into being after the old Tertiary deluges of lava are the aggregates that are building the Northwest. The lava beds "in place" do not vary a great deal as to color. They contain fairly uniform dark to black, fine-grained to amorphous rock; however, the beds vary from columnar to horizontal beds, from friable to massive, and from tough to brittle. Nature for the



Location map of McNary dam project

AGGREGATES

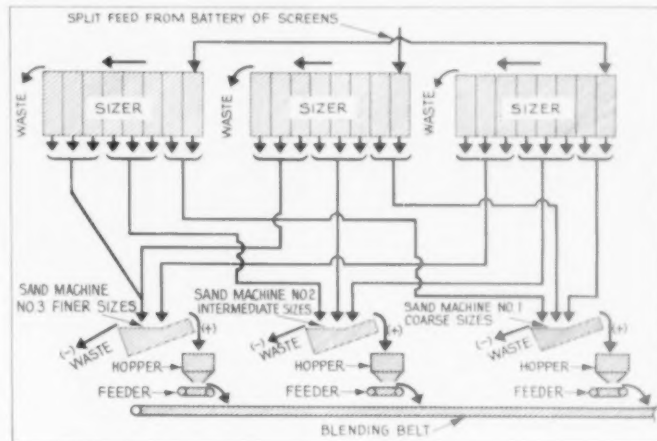
past millions of years has sorted out the weak from the strong and it is this remnant type of resistive aggregate that is going into the dam.

To carry out the construction of this project, it has been divided into three segments, any one of which by itself would be a worthwhile undertaking. The topography adjacent to the dam site, considering the great volume of water to handle, does not lend itself to a diversion of the river so that the dam can take shape more easily. It is being built piece-meal. The Washington side is now practically completed. The aggregate processing plant and the batching facilities on that side have all been removed and new facilities were provided for the segment now underway on the Oregon side.

Contractors

The aggregate for the work on the Washington side was supplied to the prime contractors by J. G. Shotwell of Albuquerque, N. M., but the new aggregate plant is owned and operated by the McNary Dam Contractors, who are the principal constructors. This parent company is made up of the Guy F. Atkinson Co., Ostrander Construction Co., and J. A. Jones Construction Co.

Before the contracts were let, the Army Engineers made extensive surveys of the aggregate sources adjacent to the job and in earlier specifications indicated that the material would come from Berrian Island near the Washington side; however, the material for the Oregon side is coming from river gravels excavated from the Columbia river proper at a point below the construction site. The sand and gravel are removed from the pit during the low water periods and the raw aggregate stockpiled nearby. For this work a 4-B Bucyrus-Erie drag-



Flow plan of sand plant

line with 5-cu. yd. Esco bucket and a fleet of Euclid trucks are used.

At first there was some reluctance by the Army Engineers to using this aggregate, but due to its excellent service record in the area, its use was permitted.

Aggregate Service Record

The service record is an important factor. When making the plant inspection we commented on the fact that stone ladders were used in stockpiling coarser aggregates and in the small service bins ahead of the stockpiling facilities. In the storage pile the material drops an appreciable distance, possibly 75 ft. maximum, but in the bins the drop is only a matter of 12 or 15 ft. When this observation was made the contractor's representative remarked, "... the material is very brittle, and if dropped a couple of feet would be apt to spall ...". Later

we were advised by representatives of the Army Engineers that the aggregate had a L. A. rattler rating of 14.5. Be that as it may, the service records in the area showed that good concrete resulted from its use.

Sand Plant

The gravel screening plant itself is a conventional one as will be seen by the brief description of it that appears later, but the sand processing equipment has many features that are out of the ordinary, and embraces a production problem that is quite unique. Specifications for the sand are such that, at the time of inspection, four different sizes of sand were being blended continuously to make the final product—one size of concrete sand. Some trouble is still experienced in maintaining enough fine sand in the blend, so possibly by the time this is printed a fifth size of sand will have



Drawing showing layout of aggregate plant

been added to the assembly line to get the desired end product.

The first blend or addition of sand is made near the primary feed to the plant. Euclid trucks deliver the pit material to a truck hopper under which is a Tel-smith feeder. This unloads to a belt conveyor (No. 1) that serves a Symons vibrating grizzly with 6-in. openings. The oversize, small in amount, is discarded. The fines fall to belt No. 2. To this long belt, the first blend of sand is added. The pit-run is deficient in the plus 30-mesh minus 8-mesh size, so sand of this approximate gradation is purchased from nearby commercial producers, trucked to the plant and fed to the belt by a Jeffrey vibrating feeder. This is Blend No. 1. Belt No. 2 serves the final screening plant.

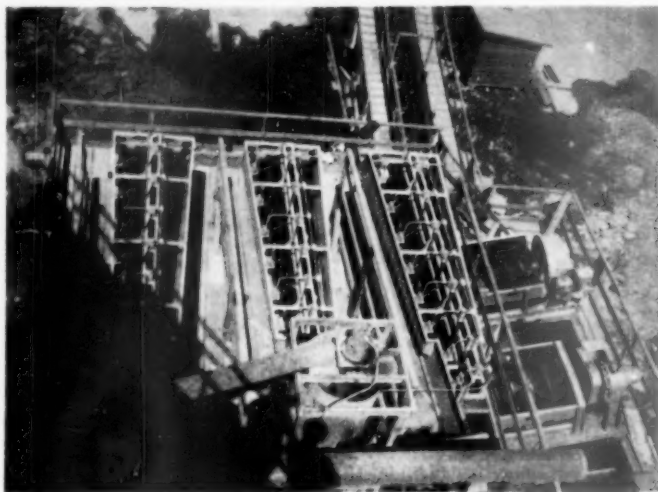
Sand from the battery of Symons screens is collected in launders and piped to the adjacent sand plant, where the plus 16-mesh minus 1/4-in. is scalped over a single deck 4- x 8-ft. wet Symons sand screen. The plus 16-mesh sand goes directly from the screen to a storage bin and feeder above the blending belt.

Sand Production

The minus 16 mesh from the Symons sand screen splits and flows to three 8-spigot Dorco sand sizers that operate in parallel. Because of the stiff specifications on projects in the Northwest, this type of sand classifier is finding a wide-spread use inasmuch as eight sizes of sand can be produced continuously and easily at one setting from an 8-spigot unit. With two units, theoretically at least, 16 sizes of sand could be produced, and from three units—and again only theoretically—24 sizes could be produced.

In operation, the Dorco unit provides for the pulp to flow in one end of the trough-like machine, which is divided into eight compartments. Each is provided with a discharge spigot that opens and closes automatically when that compartment has sufficient sand in it to maintain optimum operating conditions. Through a hydrostatic header, pressure regulators, suitable constriction plates, etc., each compartment can deliver a predetermined size of sand and automatically discharge it from its compartment. Essentially this is a group of counter-current, hindered settling hydraulic classifiers arranged in a single row with fresh water from a steady or constant level head tank introduced near the bottom of each sorting column. It operates smoothly, continuously, automatically, and with a minimum of attention.

In the McNary dam set-up, the 24 spigot products are combined to give three sizes of sand. To do this, recalling that the units operate in parallel, the spigot product from the first two spigots of all three units is combined. This makes the largest size from the



Looking down on the three 8-spigot sand sizers; sand machines (three also) are at right

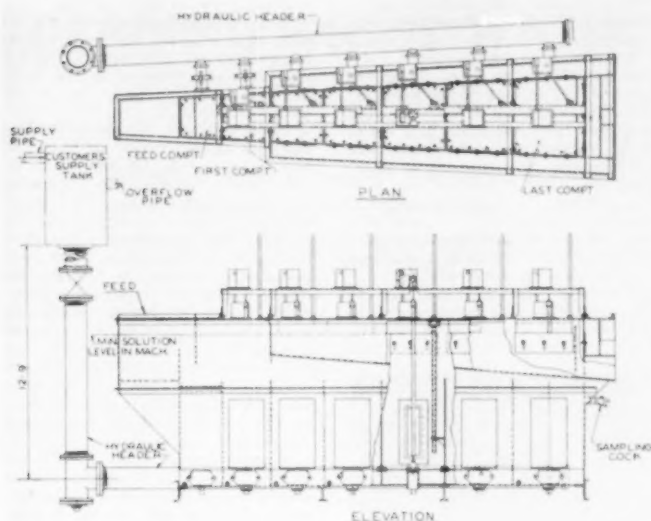


Partial view of stockpile system; the three piles at right (one visible behind trestle) are for one size sand, thus permitting up to 72 hr. draining

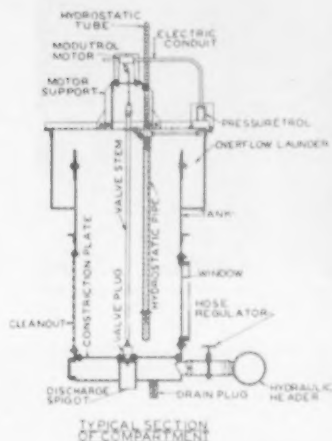


Batching plant as seen from top of the screening plant; four 4-cu. yd. mixers are used

AGGREGATES



Details of sand sizer in use on dam project; eight sizes of sand can be produced on one machine continuously at one setting



Dorco sizers (minus 8-mesh). The spigot products from the next three outlets are all combined from the three units (9 spigots) to make the intermediate size. Lastly, the three end spigots from all three Dorco sizers are combined to make the finest size. Each of these three products next flows to its Wemco sand machine, mounted directly below the sizers. There are two 48-in. Wemco sand spirals and one 36-in. unit. The unit handling the finer sizes of sand is provided with a long weir and flared tank at the low end to give more settling area.

Each of these Wemco sand spirals discharges to a small, rectangular, hopped-bottom steel tank that holds about 25 tons of material. The tanks are arranged in a single row and each is provided with a small Jeffrey elec-

tric vibrating feeder at the bottom outlet. These discharge to the blending belt which in turn delivers to a shuttle belt mounted above the sand stockpiles. If any of the three small steel bins becomes full, provisions are made for them to overflow to either a 4-in. or a 6-in. Wemco sand pump, and the material is wasted.

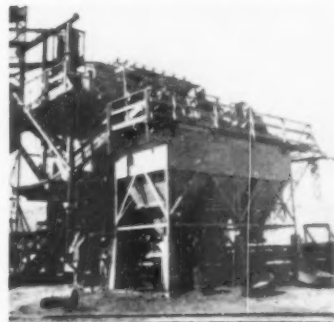
The spigot products from the Dorco sand sizers are sent to their Wemco sand machine for dewatering by conventional metal launders and 2-in. rubber hose. The spigot product from any group of the sand sizer assembly could easily be sent to any of the Wemco sand spirals or to waste. This provides a very flexible system. Water for the units is from a steady head tank mounted in the main screening structure about 20 ft. above the sand classifiers.

The concrete sand, at times, is deficient in the minus 100-mesh material; this is being added on the primary or No. 2 belt conveyor. This is accomplished by dividing the blend sand hopper to feed both blend sand and "Pan" (mostly silt with some very fine sand) onto the vibrating feeder. The flow of each is governed by a separate slide gate on the face of the hopper, an arrangement which has worked very satisfactorily. There are large deposits in the immediate area that have been wind-sorted and are usable as fines.

The specifications required as regards the sand and the coarse aggregates are appended.

Coarse Aggregate

Like most of the federal-sponsored construction jobs where mass concrete



The three steel bins receive the dewatered sand from sand machines. Under each bin is a vibrating feeder for making a blended sand on the offbearing belt

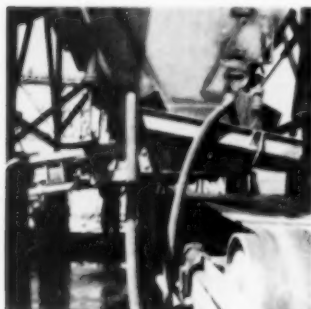


Coarse aggregate withdrawn from stockpiles is rescreened on this 5- x 12-ft. vibrating screen before being conveyed to the batching plant; throughs are wasted

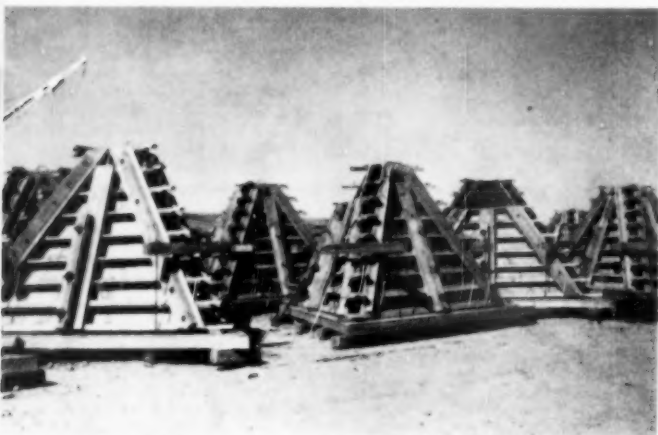


Reclaiming belt operates in tunnel of laminated wood construction, the one belt reclaiming both fine and coarse aggregate. Note stone ladder in center

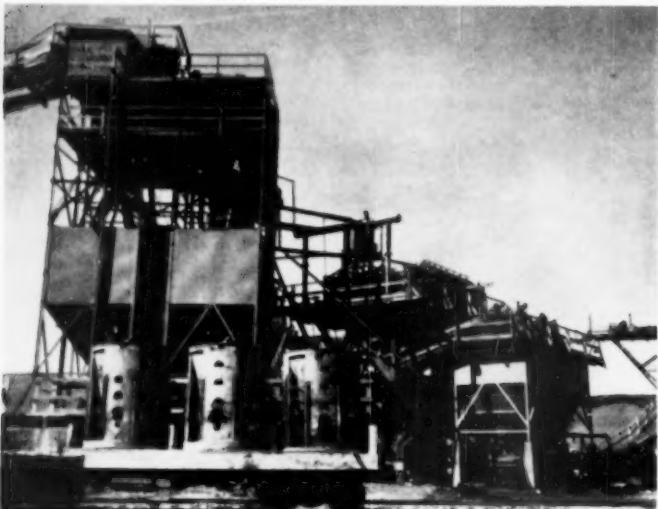
AGGREGATES



One of three vibrating feeders under the small sand bins holding discharge from sand machines



Precast concrete pyramids, each weighing 12 tons, are being used as riprap for the final dam closure; 3000 are being cast



Sand production is at right; screens used in the final sizing are mounted above the steel bins at left

is involved, four sizes of coarse aggregate are processed. These are: plus 3-in. minus 6-in.; plus 1½-in. minus 3-in.; plus ¾-in. minus 1½-in., and plus 4-mesh minus ¾-in. These are prepared on a battery of four Symons wet, vibrating screens mounted over four relatively small bins ahead of the stockpiling system, as only one size of coarse aggregate can be stockpiled at a time. There are two 4- x 8-ft. and two 4- x 12-ft. wet Symons screens arranged in two rows with the feed split to each. Both are double-decked and wire cloth is provided to give the sizes mentioned.

Provisions also are available to take any of the coarser sizes in the bins and send them via an inclined belt to a 4-ft. standard Symons cone

crusher. The crushed product will return to the screening tower via the main belt (No. 2). This is the longest and widest (36-in.) belt in the plant and was supplied by the B. F. Goodrich Co. The plant has a capacity of 400 t.p.h.

The sand from the sand blending assembly line is elevated and conveyed to a cross shuttle belt that builds up three stockpiles over the reclaiming tunnel so that 72 hours minimum drainage time is provided. The reclaiming belt operates in a tunnel of laminated wood construction, the one tunnel serving both the fine and the coarse aggregate reclaiming system.

All coarse aggregate withdrawn from the storage piles is rescreened enroute to the batching plant. For this purpose a 5- x 12-ft. Tyrock vibrating screen is used. It operates dry and the fines fall to a short stacker belt that discards the throughs to a ground pile.

The batching plant features the use of four 4-cu. yd. Koehring mixers served by Noble automatic weigh batching equipment. Protex is used as an air-entraining agent.

Dam Construction

The general plan of construction of McNary dam entailed the construction of a cofferdam on the Washington side. After that side was completed another cofferdam was constructed on the Oregon side. During these two stages, the river water flowed between the two temporary dams. When the final closure is made the water will pass through the sections completed on both wings and a third cofferdam will then be constructed in the mid-section so that the spillway can be completed.

The final closure of the mid-section will first be by an earth and rock fill which will be stabilized at the downstream end by some 3000 pieces of artificial riprap.

These pieces of riprap are made of concrete, precast on the job in the form of a tetrahedron. Each piece weighs 12 tons. Wood forms are used for the pour.

Extensive tests were made by the engineers, directed towards the design of a construction unit of this type. It was found that a pyramid-shaped piece of concrete, when dumped into a flowing stream of water, would stack and wedge better than any other shaped object. The final closure of any dam of this type is a ticklish undertaking and much of the success of the project can hinge on this part of the construction. In the case of the Columbia river, where such large volumes of water are encountered, this closure operation is a major construction item in itself, for it alone involves some 360,000 tons of precast concrete.

McNary dam is located on the Columbia river about 2½ miles up-

(Continued on page 74)

DRAINING EXCESS WATER FROM SAND

Concrete slabs of special properties as used in water treatment plants suggest as a solution to dewatering problem



By ROYAL E. FOWLE

THE PRODUCERS OF SAND face a common problem, that of manufacturing a finished material with a moisture content sufficiently low so that the product will handle readily at the plant, load easily, and finally, be acceptable for use as plaster, mortar, or blast sands or as a fine concrete aggregate.

The majority of sand classifiers produce sands of such high moisture contents that this fine, wet aggregate often becomes difficult to handle on conveyors. It mashes or slushes into the receiving bunkers or storage piles where the loading out for shipment for immediate use can become quite involved because of conveyor-spilling, slush surges at gate openings, as well as other belt spillage. The use of higher speed conveyors, ribbed conveyors, and continuous skirt boards are but a few of the methods which have been used in endeavoring to whip this problem of handling over-wet sand.

Water drip and drainage from sand bunkers is a common sight, not only at aggregate producing plants but also at concrete batching plants where the excess moisture becomes an in-

convenience or a detriment. This is particularly true for those first three or four batches after the sand in the bunker has stood overnight or for any period of time sufficiently long to allow moisture concentration near the bottom of the loaded bunker.

Methods of Sand Drainage

Sand storage piles which have been fed by cantilevered conveyors or by tripper conveyors usually have perforated pipe drains placed below a graveled base for removal of water.

Where concrete batching plants are located at producing plants it often becomes necessary to use more than one conical storage pile, allowing drainage time for the material to reach the required maximum allowable moisture before use. This multiple storage system is at times accomplished by a reversible cross belt or by swivel or tilting chutes. At other times it may become necessary to use a crane to form separate dewatering

piles and then rehandle the sand during the batching plant bunker loading.

Tripper conveyors have an advantage in forming a pile, usually sufficiently long, and of adequate volume, to allow for the recovery of dewatered material by tunnel conveyors or by a crane.

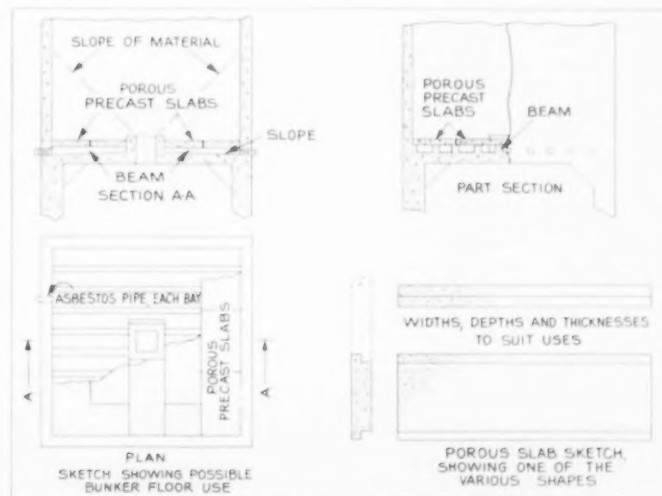
How can dewatering of bunker sand as well as stockpiled sand be speeded? How can some of the costly handling of slush-wet sand be reduced? The obvious answer is to use properly operated classifiers with characteristics that tend to produce sand of a sufficiently low moisture content. This would result in greater ease of handling on conveyors as well as reducing the bunker or storage pile dewatering time.

It is not always desirable, economical or feasible, however, to replace existing sand classifiers merely because the sand which they produce has a moisture content which is unsatisfactorily high.

Porous Slabs for Sand Dewatering

Porous concrete slabs are widely used in the slow sand filters of water works purification plants. Water is usually fed from settling basins to the covered filters where it passes through the sand bed by gravity flow. These sand beds are normally five to six feet in depth with the water surface usually standing six to ten feet above them. The entire load of sand and water is carried on a porous concrete slab system which is in turn supported by beams, girders, and columns. The water is collected, chlorinated and distributed after passing through the filter sand bed and this highly porous floor slab system. The floor system in the filter plant of a California water works is made up of interlocking slabs as shown in the enclosed pictures.

The only aggregate used passed a $\frac{1}{8}$ in. square opening and was retained on a $\frac{1}{4}$ in. square opening. It was re-washed and rescreened, over a $\frac{1}{8}$ in. square opening before mixing, a vibrating screen being installed on the job for this purpose. Sufficient cement and water were used to form a paste of medium consistency to coat all aggregate pieces thoroughly, yet not form a surplus or concentration. The



Use of porous floor and base slabs for dewatering sand

PERLITE INDUSTRY MAKING RAPID PROGRESS

Specifications for concrete aggregates adopted by Perlite Institute at St. Louis meeting. Quality control, merchandising and research given emphasis



Retiring president Y. C. Carter, left, wishes luck to new president John Brouk, Precast Slab and Tile Co., St. Louis, Mo.



Palmer G. Craig, left, chinning with Fred Seitz, Buffalo, N. Y.



Hayden Brooks, of lime putty fame, come up from Birmingham, Ala.

THE PERLITE INDUSTRY is continuing its rapid growth, and is making great progress in the standardization of its products, in the development of new applications and in providing the tools for an aggressive and effective merchandising campaign. A year ago, the value of processed perlite sold nationally was \$1,200,000; for 1950, the volume of sales will be approximately \$3,000,000.

Much of the reason for this creditable performance is due the Perlite Institute, national organization for perlite ore producers and expanders, which was organized in Los Angeles early in 1949 and which has since held three national meetings. The meeting held at the Chase Hotel, St. Louis, Mo., September 14 and 15, 1950, was, in many respects, the most successful held to date.

Reports of the various committees as presented, and the panel discussions and papers given showed that a great deal of progress has been made and will be made for the benefit of the industry. The institute is insisting upon the maintenance of quality standards which are so essential to the acceptance of its product and is developing sound specifications through a program of research. It now has accumulated a wealth of test data and performance records which are going to be the foundation for a planned program of advertising and sales promotion about to start.

The program was highly diversified. Merchandising was given prominence, as were technical problems, specifications and research with particular emphasis on the research program on concrete which is being conducted for the institute by Dr. F. O. Anderegg, Building Materials Director, John B. Pierce Foundation, Raritan, N. J. A panel discussion on perlite concrete in connection with Dr. Anderegg's progress report developed lively discussion and much valuable information on mix ratios, sieve analyses and rational specifications. Other subjects covered were the possible impact on the industry of wartime restrictions, new uses for perlite, the outlook for business, the tightening of perlite plaster ag-

gregate specifications and the maintenance of quality standards.

The institute now has 37 members, covering 21 states, which makes perlite aggregates available by short haul to all major construction centers. Ten of these members have been added since the March, 1950, meeting held in Chicago, Ill. The majority of the members are now east of the Rocky Mountains, and not in the west.

Officers

T. C. Carter, vice-president, Great Lakes Carbon Corp., New York, N. Y., first president of the institute, was paid appropriate tribute, at the conclusion of his term of office, for his accomplishments and efforts in the organization of the industry and in building a sound association for promotion of the welfare of the industry.

J. John Brouk, Precast Slab and Tile Co., St. Louis, Mo., succeeds Mr. Carter as president and Kirk E. Hazelton, Cleveland Gypsum Co., Cleveland, Ohio, was elected vice-president. Both officers were elected for 2-yr. terms according to the by-laws which provide for a rotating board of directors, whereby the terms of two directors expire in one year and those for the other three directors expire in two years. Elected to the board of directors were Donald Gott, Great Lakes Carbon Corp., New York, N. Y., (two years); and S. Q. Johnson, Texas Panacalite Co., Dallas, Texas, and Lewis Lloyd, Alatex Construction Service, New Orleans, La. (one year terms).

Committee Reports

Reports of the several committees were presented in the opening session. Harry E. Lewis first presented the report of the technical committee, which has been very active. One of the activities covered was the 4-hr. column fire test for perlite plaster on gypsum lath under sponsorship of McNulty Bros., Chicago.

An important accomplishment has been approval by the committee of a gradation standard, previously considered, for perlite plaster aggregate, which represents a narrowing of the permissible limits. The gradation approved, and which becomes the basis for inspection of plants to qualify for use of the institute insignia, is as follows:

Mesh	Percent retained by weight (cumulative)
8	0 - 10
16	10 - 40
30	35 - 75
50	70 - 95
100	90 - 100

The technical committee will meet with the ASA in an attempt to have the density specification for perlite plaster aggregate reduced from 7½ to 7 lb. per cu. ft.

Mr. Lewis touched upon other activities of his committee, which have included studies and discussions of mixing methods for perlite concrete

with particular attention to air entrainment, order of mixing, speed of rotation of the mixer, mixing time, expansion and shrinkage, reinforced concrete, etc. The committee recommended that no standards be established at this time for sound transmission and sound absorption because of insufficient test data available for guidance. Fire tests likely to be conducted in 1951 were discussed. Another possibility for study is the performance of roof decks of various types, upon which a perlite concrete covering has been superimposed.

The technical committee has been considering setting up a specification for perlite concrete aggregate in recognition of a need for standardized practice. Consideration was given by the committee to adopting the same densities, of from 7 to 11 lb., and the same sieve sizes as apply to perlite plaster aggregate in establishing a perlite concrete aggregate specification, but the subject was thrown open to discussion in the event a coarser, denser product might prove desirable.

In view of the fact that several companies have been producing a coarser, heavier aggregate for concrete than for plaster application, there was much discussion on the subject of whether or not a single specification, or several, should be adopted. It was finally voted that two specifications be adopted in order not to exclude some of the products of various densities that can pass performance standards. The one specification is identical to that governing gradation and density for perlite plaster aggregate; the second, for perlites in the 12-20 lb. density range, complies with ASTM specification C-130 for gradation of lightweight aggregates, which has as its basis aggregates like Wayite and others of similar properties.

Publicity Committee Active

Jack A. Portman read the report of the publicity committee which also has been very active. This committee held an interim meeting August 8 in Pittsburgh, Penn., and one of its main accomplishments has been the decision that the Perlite Institute be represented in the next architectural edition of Sweets Catalogue. The board of directors has approved a 4-page layout for the September, 1951, edition, soon to be published, and will feature mix specifications, a digest of fire ratings granted, acoustical data, the names of member companies and other pertinent information. Reprints will be made available for individualized use by member companies.

Another form of publicity to be prepared is a "Perlite Newsletter" to be written by secretary-treasurer Wharton Clay and to be published six times a year. This will be an illustrated publication, printed in offset, and will be sold to members at low cost in quantities and also be made available

to government agencies, real estate agencies and other influential building organizations. Representative of the type of material to be published are plastering figures, technical data, job applications and news stories on use.

The committee is accumulating lists of publications to which news releases will be sent and is standardizing its form of presenting editorial releases. An industry brochure is also under consideration. The committee is planning to meet four times a year.

E. L. Jones, in reporting for the special committee appointed to consider the possibility of standardizing bag sizes, said that a recent survey showed the 4-cu. ft. bag to be almost universally used. However, a few producers continue to use 2- and 3-cu. ft. sizes. The opinion of the committee was that it would not be desirable to rule out the use of the smaller sizes of bags, particularly because orders had been placed for such bags in anticipation of shortages and possible rationing. Discussion developed that there were substantial economies to be effected in packing and shipping the larger bag. The institute went on record as recommending only that size of bag as a standard.

Wharton Clay gave his financial report and President Carter followed with comments on certain phases of association activities under consideration. He said that the growing concentration of production in the east made it desirable to continue to have the institute office in New York City. A decision has been made not to permit associate memberships. Policy is to hold two meetings a year and operating men are to be invited to attend the regular meetings, where they can hold separate gatherings to discuss production problems.

The institute is considering ways and means to put teeth into the meaning of its insignia which is available for use by members on their products. It may ultimately take the form of a licensing or contractual arrangement in order to guarantee the maintenance of quality standards.

Research

An entire session was devoted to a discussion of perlite concrete by a panel consisting of J. H. Bradford, J. J. Brouk and Harry E. Lewis of the technical committee, and Dr. F. O. Anderegg who is conducting a research program for the institute.

The basis for the research now being conducted is to determine the properties of perlite aggregate, including densities, gradation and yield, in order to arrive at the optimum properties for best performance and greatest economies. Dr. Anderegg, after first describing the purposes of the John B. Pierce Foundation, commented on preliminary observations from the work now under way. He



R. A. Clark, Atlantic Perlite Co., Boston, Mass., a new producer



Howard Mason and Fred Seitz (left to right), plastering contractors and new Buffalo producers of expanded perlite



Two new directors, Lewis Lloyd, New Orleans, La., left, and E. W. Johnson, Dallas, Texas



George Katterlohn has fun as Lewis Lloyd is snapped

said that compressive strength has been proved to be directly proportional to density of the aggregate and inversely proportional to the voids. To emphasize the importance of grading, he told of an instance where, for a given concrete of perlite aggregate, the compressive strength was increased from 500 p.s.i. to 1700 p.s.i. purely through development of a gradation which permitted the cement to function most effectively. The role of particle shape and gradation in promoting workability was discussed.

It has been observed that, while flexural strength of plaster decreases with the lighter plasters, the decrease isn't as great as reduction in compressive strength. The K factor (heat insulating) decreases with the lighter weight plasters.

Much of the work is being done with air-entraining agents, various mixing times, etc. and in order to determine properties of various mixes when using established gradations of aggregate.

An interesting limitation on the use of perlite ready-mixed concrete is that, due to its lightness, mixing in drum-type mixers is difficult. In heavy concrete, the inertia of the aggregate affects the mixing, and because that inertia is lacking in perlite concrete, the paddle-type mixer is considered most satisfactory. Dr. Anderegg said that further study might determine that the optimum density of perlite for concrete might be in excess of 8 lb. He concluded by pointing out that there are wide variations in characteristics of different perlites that will influence results as obtained from research.

Air entrainment and the use of various air-entraining agents were discussed in some detail by the panel of technical men. One point brought out was that air is not entrained in proportion to the amount of agent used. The optimum amount of air entrainment is still to be determined. Hercules Powder Co., manufacturer of Vinsol resin, is planning to cooperate with the institute research program in its studies of water-cement ratios, aggregate ratios, densities, mixing time and other factors.

Mr. Brouk, in cautioning against over-selling jobs, pointed out that plastic flow is substantial in lightweight concretes and urged that shrinkage and expansion of concrete be considered. In commenting on mixer operation, he said that time of mixing must be governed so as to yield wet density that will give the required performance properties as measured by dry concrete tests. In his experience, slumps up to 5 or even 7 in. give satisfactory results. As to density, he said that 20-35 lb. concrete will be most commonly used, which should be produced with a 7-12 lb. perlite. In his experience, large particles, in the 1/4-in. range, are of no advantage and

complicate screeding. Dr. Anderegg commented that there is no loss in air content whether mixing time be 1/2 or 12 minutes.

One of the problems in the use of perlite concrete has been loss in yield when delivered in ready-mixed concrete trucks. One producer told of extreme cases where the loss in yield had been as much as 40 percent. Another producer reported that he had had successful results in combating the problem by first putting the mixing water in the drum, and in considerable excess.

Merchandising

"How to Sell Perlite Plaster in Competition with Sand" was the subject of a panel discussion by three plastering contractors, F. L. Marcon, Allentown, Penn., Dale Andrews, Dallas, Texas, and Howard Mason, Buffalo, N. Y. All three of the speakers were agreed that perlite aggregate has many characteristics of advantage to contractors, when properly graded and of correct density and uniform manufacture. Mr. Marcon said that he believes perlite will eventually replace sand as a plaster aggregate. Ease in handling and lightness were properties which he considered important characteristics. He said that the ideal was a product that would result in plaster approaching the strength of sand plaster. Other advantages mentioned were improved quality of jobs and less wear and tear on building mechanics.

He cautioned that the industry not over-sell its product and recommended that instructions be printed on the bags. In urging that perlite have proper gradation and be productive of high strength, he pointed to the fact that modern streamlined buildings are being built higher and of lighter construction, with the result that plaster must be of high quality. He does not believe it necessary to sell perlite aggregate on a per ton basis but rather that its particular advantages be stressed in merchandising. Good selling points, in his opinion, are reduction in manual labor, in waste and in messiness on the job.

Mr. Andrews said that a sound merchandising practice should include a definition of company policy to be maintained, a price list uniform to all, and a working arrangement with qualified dealers who must first be sold on the product. He recommended that such regular channels of distribution be utilized and supported by publicity.

Mr. Mason, whose company also is a perlite processor, described circulars and direct mail pieces that his company is distributing. Circulars are distributed to architects, real estate companies, home owners and contractors. The first letter was largely devoted to definition and included data taken from literature of the Perlite Institute. Other letters have followed this

opening one in a series of educational mailing pieces. Mr. Mason stressed that extra cost for perlite aggregate over other competitive materials is more than offset by advantages gained by the contractor on the job.

David B. Hagenbuch of *Progressive Architecture* presented a sound film, "The Specification Story," which was designed to show how to sell a building product to architectural organizations.

Washington Happenings

Wharton Clay, in his report covering the Washington scene, said that the building outlook is confused but he believes that the government will continue to want as many homes built as the availability of materials for the purpose will permit. He said that there continues to be much interest in improvements for low-cost construction, citing that there is a movement to permit lower compressive strengths for masonry units used in 1- and 2-story structures.

In touching upon new outlets, he said that study is needed to determine the possibility of using perlite fines as a replacement for cement, like fly ash, in mass concrete structures. Other relatively new uses mentioned are in agricultural, as a filter, for oil-well concrete, as extenders, etc. He urged that members list the various applications developed, particularly because the industry is faced with having to show its essentiality. He concluded by stating that the industry may be confronted with the loss of key personnel to the war effort.

The institute has a committee to set up job classifications and is taking steps for recognition as a new industry. It also has a traffic committee which is active in investigating freight rates for inquiries.

Registration List

- R. S. Alday, R. S. Alday Clay Products, Shreveport, La.
- F. O. Anderegg, Pierce Foundation, Baritan, N. J.
- C. O. Anderson, Ozark-Mahoning Co., Tulsa, Okla.
- Dale Andrews, Perlite Products Corp., Dallas, Texas
- W. G. Baringer, Pennsylvania Perlite, Allentown, Penn.
- R. L. Belden, Alstex Construction Service, New Orleans, La.
- J. H. Bradford, Combined Metals Reduction Co., Salt Lake City, Utah
- Hayden Brooks, Blue Diamond Co., Birmingham, Ala.
- J. J. Brouk, Precast Slab & Tile Co., St. Louis, Mo.
- C. D. Brown, Toledo Plaster & Supply Co., Toledo, Ohio
- Ray Burkett, Perlite Mines Co., Denver, Colo.
- Frank Calkins, Panacalite Perlite Inc., Kansas City, Kan.
- Orrin K. Carr, Carr-Lite, Inc., Lake Zurich, Ill.
- T. C. Carter, Great Lakes Carbon Corp., York, N. Y.
- L. J. Cavenah, Midwestern Perlite Corp., Oklahoma City, Okla.
- Eldred Cayce, Tennessee Products & Chemical Corp., Nashville, Tenn.
- R. A. Clark, American Bldgbrk Co., Chicago, Ill.
- William O. Clark, Atlantic Perlite Co., Boston, Mass.
- Wharton Clay, Perlite Institute, New York, N. Y.
- James P. Corbitt, Wellite Corp., Tulsa, Okla.
- Robert L. Cornish, Great Lakes Carbon Corp., New York, N. Y.

(Continued on page 93)

Wet vs. Dry Process

Semi-dry process plants which affect nodulization of kiln feed may prove practicable with improvements perfected

ABOUT 20 YEARS AGO, wet process manufacturing of cement displaced to a large degree all other manufacturing methods used in the cement industry, and with good reasons. In the wet state, slurry could be conveyed and blended to the required chemical composition more easily than in dry pulverized form, and for soft materials, wet grinding was cheaper than dry grinding, if open circuit processes were compared. With chalky materials, as are prevalent in the British Isles, washing and sieving could often substitute for grinding, which simplified operations and required lower capital expenditure also. It is regarded as a particular advantage of the wet process that very large amounts of slurry can easily be pumped, thoroughly blended and stored in large

By DR. STEVEN GOTTLIEB*

silos and tanks, which has particular significance for large daily outputs. All these advantages were regarded as so overwhelming that the disadvantages of larger capital expenditure for the necessary longer kilns and the higher fuel consumption were generally accepted as worthwhile.

However, the continued increase of fuel and equipment prices forced the users of the wet process to search for ways and means of improving their fuel economies to outweigh the disadvantage of evaporating large amounts of water.

Much ingenuity has been exercised to increase the amount of heat transferred by convection in relation to that transferred by radiation. Desic-

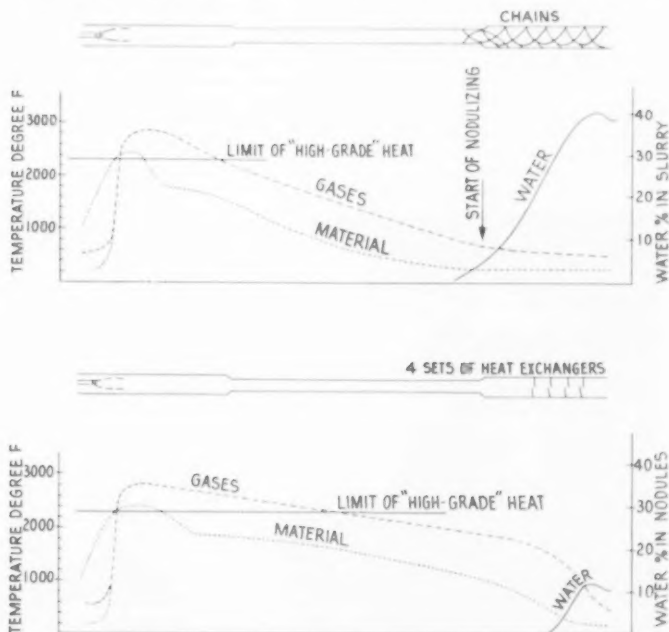
cators, separate rotating drums filled with heat-exchange promoting media ("calcinator"), crosses, spray systems and heat exchange chains are a few examples among the many attempts. They all progressed with improved designs, though some of their disadvantages could not be eliminated entirely.

The desiccator was particularly an effective improvement. The "calcinator," using heat-exchange rings which rotate in a drum, could be developed to an efficient level, though the choking up of the rings always presented a problem. It must be regarded as a disadvantage of the calcinator units that separate attendants were required. One of the most promising efforts was the spraying of slurry at high pressure into the kiln, which became particularly successful after nozzles of special wear-resisting steels were used. But convective heat transfer at a higher rate is only possible during the relatively short time in which the slurry droplets are moving through the gases. Therefore, a fairly high gas temperature is necessary to transfer a substantial amount of heat in a relatively short time to evaporate water from the droplets. Thus higher output can only be bought at the expense of relatively higher exit gas temperature, which means greater fuel consumption.

The methods of filtering slurry required high maintenance costs, though with certain types of slurry the operation of filtering became quite efficient. The reduction of water content in the slurry, achieved by chemicals containing alkalis, was quite effective, though not in kilns with long chain zones. But there are quality and firebrick considerations dictating against the use of such chemicals.

Chain System of Heat Transfer

The chain system is one of the simplest and most favored methods of promoting heat transfer, sometimes in combination with the "cross." However, chains necessitate relatively long kilns and promote clogging ("mud or slurry rings") if the amount of water drops below a certain level, the value of which depends on the design of the chain system and the quality of the slurry. With certain types of raw ma-



Comparison of heat efficiencies. The top drawing represents a wet process rotary kiln, with a semi-dry process rotary kiln sketched below

(Continued on page 95)

PRODUCTION MEN DISCUSS LIME

National Lime Association's operating division emphasizes fuel conservation; foreign plants, material handling and research also considered

MORE THAN one hundred attended the sixth meeting of the Operating Division, National Lime Association, held September 18-20 at the Nittany Lion Inn., State College, Penn. Selection of the meeting place was to permit inspection of the rotary lime kiln plants of the National Gypsum Co. and the Warner Co. at Bellefonte, Penn., which are among the finest high calcium lime plants in the United States.

The program of scheduled events differed from previous meetings in having more prepared talks but it was the consensus of opinion that the program was one of the most constructive yet held. An entire session was devoted to a panel discussion of fuel conservation; pneumatic conveyors and foreign developments in lime manufacture were topics for a second session; and material handling and research were covered in the concluding session. An entire day was set aside for inspection of the plants, via chartered buses, and a group luncheon was served as guests of the Warner Co. and National Gypsum Co. That evening, the National Lime Association was host to a group dinner and group entertainment at Camp Hate-to-leavitt, a mountain lodge owned by Tilton Metal Manufacturing Co.

William J. Ash, New England Lime Co., Canaan, Conn., was program chairman, and Arthur C. Hewitt, Warner Co., Bellefonte, Penn., and Harold Gustafson, National Gypsum Co., Bellefonte, Penn., were in charge of arrangements. John Andrews, The Kelley Island Lime and Transport Co., Cleveland, Ohio, was elected to succeed L. N. Carmouche, Dow Chemical Co., Ludington, Mich., as chairman of the Operating Division for the coming year.

Foreign Lime Plants

Victor J. Azbe, who has recently completed trips to Europe, Palestine and Latin America, spoke on lime manufacture in the many countries visited. His talk was illustrated by slides showing primitive types of plants and, by contrast, the most modern ones encountered. According to his observations, there is much to be done in

foreign countries to improve the efficiency of lime plants.

Azbe systems for burning lime outside the United States are now operating in Canada, Hawaii, Mexico, Guatemala, Chile, Brazil, Argentina, Jamaica, South Africa, Israel, Spain, France, Sweden and the Dutch East Indies, and installations are being considered for Germany, Italy, Greece, Egypt, India, Australia and Venezuela. Mr. Azbe gave much credit to American manufacturers of lime for the experiences gained in working with them, which have enabled him to extend his activities to the point where they undoubtedly will be world-wide.

Mr. Azbe's concentration, in designing plants, has been directed toward cost reduction, due to the rapid increase in costs of labor and fuel throughout most countries. His talk was far too lengthy to cover in full so we merely touch upon highlights.

In Israel, large kilns of the intermittent type, which he illustrated, have a labor requirement as much as 6 hr. per ton of capacity while fuel consumption ranges from 65-90 gal. of oil per ton of lime. The only available fuel is oil from Venezuela, costing about \$26 per ton delivered. A new

Azbe plant in Israel was shown. A system was developed (and patented) to enable gasification of oil within the center and side burner canals through the aid of very hot recirculating gas. The gas is burned with preheated air coming up from the cooler.

In Mexico, small Azbe kilns are producing high calcium lime at a fuel rate of 29 gal. per ton at 35 tons per day while, in Guatemala, the average performance is 32 gal. per ton at a rate of 42 tons per day.

In Sweden, which has no fuel of its own, the recirculatory system for improved gas distribution is being applied for the maximum in fuel utilization. The installation made by Skanska Cement Co. was described in some detail. An interesting feature is that there are waste heat boilers between the shaft kilns and the fans. Mr. Azbe does not recommend the use of waste heat boilers with vertical kilns. A fundamental lime research program has been started by the Swedish Cement and Concrete Research Institute of the Royal Technical University in Stockholm.

In Germany, Mr. Azbe spent much time with Dr. Hermann Lange, president of the German Lime Manufac-



The editor's group (he took the picture) preparing to enter mine of Warner Co. Left to right are R. G. Foster and H. M. Shepherd of Winnipeg, Canada; Victor J. Azbe; W. J. Barrett, New England Lime Co.; C. B. Goiger, Marble Cliff Quarries Co.; Paul Sanderland, Ash Grove Lime & Portland Cement Co., Kansas City, Mo., and R. H. Dinges, the guide

turers Association and Dr. Gerhard Seeger whose mixed feed kilns are the principal new installations in that country. Some of the latest type German kilns were shown on slides. An impressive feature observed was the high degree of mechanization but Mr. Azbe did not consider the kiln capacities and efficiencies adequate.

Illustrated was an immense gas-fired shaft kiln at the former Hermann Goering Werke. Total structural height was 143 ft. and active kiln height was twice what it would be in this country. Blast furnace gas was preheated. Capacity of this kiln was given as 160 tons which amounts to some 1200 lb. per sq. ft. which is relatively low.

There are 27 Azbe kilns operating in Latin America, with fuel savings in the neighborhood of 50 percent when compared to the old kilns. A new lime plant is to be built for the Industrias Reunidas F. Matarazzo of Sao Paulo. In Brazil, fuel is the main problem. It must be either wood or charcoal, otherwise fuel must be imported. Immense Eucalyptus plantations are harvested every six years to provide wood for fuel. Cost delivered is about \$6.50 per ton and the requirement is often more than a ton per ton of lime. Labor, however, is so cheap that mechanization does not pay. At rates of 17 or even 13 cents per hour, which are typical, stone can be delivered into the kilns with hand labor for 60 cents per ton of lime.

Magnesite and dolomite are being sintered in Brazil, where some of the world's largest deposits of magnesite exist. Magnesita, S. A. is using Azbe vertical kilns to sinter magnesite. Charcoal is gasified successfully to attain the high temperature required. This is said to be the only gas-fired sinter magnesite plant in the world.

In Argentina, there is no fuel with the exception of wood and Eucalyptus takes too long to grow. Wood costs \$9 per ton and as much as 1.3 tons of wood are required per ton of lime. Simple gas producer systems were applied to correct the problem of incomplete combustion. Labor is high in cost and pensions, vacations, hospitalization and other social benefits are prevalent. Lime sells for \$25 a ton in bulk at the plant and for \$38 a ton in Buenos Aires.

Mr. Azbe concluded with an accounting of his trip by air and some of the incidents of his trip.

Material Handling

Pneumatic conveyors for pulverized and granular materials, adaptable to the handling of hydrated, caustic and pebble lime, flue and collector dusts, pulverized coal, and limestone pulverized to a fineness of at least 50 percent minus a 200-mesh sieve were the subject of a paper by George K. Englehart of the Fuller Co. Mr. Englehart's paper was illustrated by nu-

merous slides of practical applications, and considered the distinct field of use for each of five classes of pneumatic conveyors along with the limitations in application. Four of the types of conveyors discussed transport materials through pipelines; the other was the airlift.

Among the advantages cited for pneumatic conveyors using pipelines were the freedom in conveyor and plant equipment layout permitted; simplification in plant designs and in facilitating modernization and the additions of new equipment; speed in transport of materials to remote parts of a plant; the great distances to which materials may be conveyed in comparison with mechanical methods; the elimination of dust nuisances, dust hazards and mechanical hazards; the elimination of fire hazards in handling coal; flexibility in delivering to numerous delivery points; and low maintenance costs for materials appropriate for pneumatic handling.

For short conveying distances or elevations, equipment and installation costs favor mechanical conveyors, which advantage decreases or disappears in proportion with increased distances or with the necessity to reach multiple delivery points.

The airveyor, which conveys material in a relatively high volume of air moving at high velocity, was described in some detail and shown in several applications, including complex systems interlocked and controlled automatically and by remote control. The airveyor has little normal application in plants producing lime-stone products but many are used in customers' plants.

Of the group limited to the handling of dry pulverized materials which can be fluidized, for materials of a fineness at least 50 percent minus the 200-mesh sieve, the Fuller-Kinyon system is most widely used. Slides showed a number of applications of this system, valves to control the flow to multiple delivery points, portable systems, operation under automatic and remote control, in transporting long distances, and for unloading hopper bottom cars. The Fuller-Fluxo pump, which comprises a pressure vessel from which material admitted under control is transported by admittance of compressed air, was then described. This type has a distinct field of use in extremely long distance conveying, particularly when in excess of 2000 or 3000 ft. which is the practical limit for the Fuller-Kinyon pump.

The fourth type of pneumatic conveyor discussed was the constant head feeder used largely for constant weight feeding and for blending pulverized materials.

The airlift was described in greatest detail. This is not strictly a pneumatic conveyor but one in which a



John V. Andrews, The Kelley Island Lime and Transport Co., Cleveland, Ohio, new chairman of the Operating Division



Paul LeLiberte, left, with Arthur Hewitt



Jack Robinson, left, Gypsum, Lime & Alabastine, Canada, Ltd., Toronto, Canada, with Bolton L. Carson



Charles E. Roney was one of many "induced to wear" caps supplied by Ohio Hydrate & Supply Co. to advertise its product



Supervising the loading of lime men into mine cages are Arthur C. Hewitt, left, and H. A. Corne of the Warner Co.



Victor J. Azbe, left, talks fuel economy with C. E. Geiger



At Warner Co. plant are, left to right, Philip L. Corson, E. D. Williams, Jr., H. E. Millard Lime and Stone Co., and Fred Warner

material fluidized by aeration flows by gravity down a relatively flat incline which degree of inclination Mr. Englehart described as preferably greater than "the aerated angle of repose of the material." Rather than cover the descriptive details here, the reader is referred to the article on Huron Portland Cement Co., published in the August, 1949, issue of *Rock Products*, pp. 115-124. Briefly, an enclosed type comprises a trough-like air chamber, usually having a porous canvas upper surface enclosed by an inverted trough which forms the conveying channel. Air for fluidization is introduced through the fabric which has a uniform and high resistance to air flow. The volume flow of air through the fabric must be uniform over its length to fluidize the material and cause it to flow.

For limestone filler, a normal volume flow is 4 cu. ft. per minute per square foot of effective fabric surface at 4-in. w.g., and, Mr. Englehart said, the inclination required varies with the fluidity of the material, from 4 deg. for free-flowing materials, to as much as 8 deg. for either extremely fine materials which tend to agglomerate, or for coarsely ground agricultural limestone. In general, he said that coarser materials may be handled by the airstride than those appropriate to Fuller-Kinyon systems. For enclosed conveyors, fans are the source of air and, for the open types used for discharging bins, posi-

tive pressure blowers supply the greater pressure requirements.

Materials at temperatures up to 300 deg. F. can be safely handled on fabric airstrides and for hot materials, ranging up to 1200 deg. F., porous plates are substituted. These plates are made of ceramically bonded aluminum oxide. Upwards of 40,000 ft. of airstrides have been installed in one and one-half years, so far mainly in the cement industry. There are ten installations to date in the lime industry. Other materials handled so far were enumerated.

Generally, Mr. Englehart said that any finely divided dry, free-flowing material can be handled satisfactorily. Damp and extremely fine materials tend to agglomerate. As an example, a pitch of 6 or 8 deg. is required to handle fine bag cleaner dust. The air-feeder, which is an extension of the airstride secured to the cone of a bin, was described. Slides showed how the airstride can split streams, how curved installations enable transport around obstructions and various applications of closed and open types, to illustrate the versatility.

Airstides may be started and stopped under full load conditions, and pressures between 3 and 5 p.s.i. are required depending upon the head. After feed is stopped, very little residue remains in the airstride. To emphasize the great capacities handled, Mr. Englehart said that an airstride 12 in. wide and 120 ft. long is con-

veying pulverized limestone at 250 t.p.h. with its air requirement supplied by a 5-hp. fan. The power requirement is $\frac{1}{8}$ to $\frac{1}{10}$ that required for a screw conveyor. As to maintenance, he said that adequate information is not yet available since the oldest installations have been in continuous use for only three years. However, it appears that maintenance is very low.

In reply to questions, he said that airstides must be vented if greater in length than 150 ft., that it is preferable to run tests before establishing inclines, etc., if extremely fine or damp materials are to be handled, that traps have been designed for removal of steel, spitzers, etc., and that the main requirement is sufficient fines in a material in order to effect fluidity.

Refractories

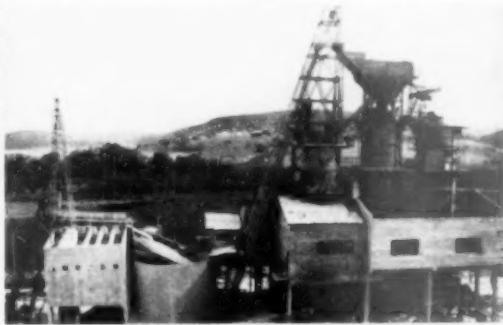
The opening paper in a session covering the burning of lime was a "Study of Lime Refractories" by R. W. McAllister, Arthur D. Little, Inc., Cambridge, Mass. Mr. McAllister's paper gave many suggestions as to how to prolong refractory life.

Rotary kiln refractories, he said in opening his discussion, represent a compromise between durability and heat conservation and the ideal refractory is one which conserves the maximum amount of heat and yet requires minimum maintenance and replacement.

To emphasize the importance of



The old: An ancient type of field lime kiln still in operation in Israel



And the new: The Azbe Israel lime plant of Lime & Stone Production Co., Ltd.

using insulating type refractories, he estimated that the heat loss from the shell of a 10- x 200-ft. rotary lime kiln lined with conventional refractories may be 10 million B.t.u. per hr. which represents consumption of 10 tons of coal per day. He estimates that one-half to three-quarters of this heat could be conserved by the use of more insulating refractories.

For purposes of discussion, Mr. McAllister considered the first fourth of the kiln as the preheating zone, the next two quarters as the calcining zone and the final quarter as the high temperature zone.

In the preheating zone, he said that a dense silica brick may last two or more years. While Duro is the brick most commonly seen in the lime industry, he believes that improvement as regards abrasion resistance is possible. Tests have indicated that paving bricks have as much as 25 percent greater abrasion resistance than Duro and it is a question of getting some paving brick manufacturer to make bricks into rotary kiln block shapes.

Mr. McAllister believes that there is much to be accomplished in the calcining zone to improve heat conservation. The life of refractories in this zone frequently runs to and beyond ten years. The 6-in. refractory block is most commonly used. He briefly described methods used to install insulation, it being the chief objection to insulation that maintenance is extensive. The most common procedure has been to line the rotary kiln shell with a highly insulating block such as Superex and then lay 6-in. fireclay refractories against the Superex to close the circle. At certain points 9-in. refractory brick is laid directly against the shell to reduce slippage. Such 9-in. block are usually laid as three complete circles every 10 or 20 ft. and a single row of such 9-in. brick in each quadrant. Some companies believe that extensive maintenance can be avoided by welding either lateral or longitudinal ribs on the inside of the shell and laying 9-in. refractory against such ribbing. It is believed that more work along this line is justified. A refractory block bonded to an insulating block has been commercially installed by one refractory manufacturer, he said.

Mr. McAllister's own suggestion is that a refractory which is a cross between an insulating block and a refractory block should be tested. Two trial installations of this brick have indicated some progress. The refractory used had a cold crushing strength above 500 p.s.i. and a conductivity or K value at 2000 deg. F. of 3.5. It is his belief that this refractory would enable heat losses in the calcining zone to be cut to one-half of prevailing rates. In one test, a 2-ft. section in the hot zone of an oil-fired kiln lasted five years.

If such an insulating refractory



Asbe kilns of the Skanska Cement Co. in Sweden

should not prove sufficiently resistant to abrasion, he suggested the use of aluminum phosphate made into a paste with grain alumina applied as a surface coating. He believes that such a surface could be re-coated.

Two other insulating refractory materials were suggested as having promise as backing materials behind standard 6-in. refractories. One is molar brick which has a cold crushing strength of about 600 p.s.i. and a K value of 1.3 at 1000 deg. F. The other is H-W 56 castable refractory. Neither one is suitable at above 2000 deg. F. so they could only be considered as backing brick. He mentioned a recent cement kiln installation which should provide valuable information. A 200-ft. section is lined with 4½-in. insulating brick suitable for temperatures up to 2300 deg. F. and which has a K value of about 3.1.

In the hot burning zones of lime kilns, the 70 percent alumina refractory most commonly used has a life between six months and two years. Some cement companies, he said, have gone to 80 percent or 90 percent alumina brick, Fosterite or magnesite because they believe longer life justifies the higher cost. In some instances Fosterite is used principally to prevent alumina contamination of lime.

It is in the high temperature zone that the greatest fuel savings are possible and Mr. McAllister believes that the insulating refractory which he recommended for the calcining zone has possible application for this zone in gas or oil-fired kilns. In coal-fired kilns, the removal of slag rings might result in loss of lining. However, the heat recovery possible should be balanced against cost of replacement in making a decision. For a coal-fired kiln he suggested, for trial in the high temperature zone, a 6-in. 70 percent alumina refractory block laid on top of a high strength insulating firebrick

of the type recommended for the calcining zone but laid on its side.

Mr. McAllister listed the thermal conductivities of various materials including those commonly used or possible for use as insulating refractory material and concluded with some remarks on the future possibilities for lime kiln heat conservation.

Because of the rapid progress in the development of high temperature-resistant metal alloys, he believes it conceivable that some alloy may make possible the construction of an inner shell in a lime kiln which will withstand high temperature and also abrasion. Loose insulating material might be placed between the two shells. The installation of ceramic preheating quadrants was mentioned as a step in the direction of carrying limestone and lime up into more intimate heat transfer relations with the hot gases.

It was also suggested that kiln linings might be fabricated from high temperature metals for highest temperatures and from other metals for other sections. Dowtherm, or other high temperature heat transfer fluid, he suggested, might possibly be placed in a jacket surrounding the kiln shell to prevent the development of shell hot spots and thus make external shell insulation practical.

Kiln Preheaters

A panel discussion then followed, on the Kennedy-Van Saun lime kiln preheater, by two producers of lime who have had experience with this equipment.

Paul LaLiberte, Cutler-Magner Co., Duluth, Minn., described the installation and experiences with a preheater installed at Duluth in 1939 when the plant was converted to a rotary kiln. The kiln is a 9- x 175-ft. Vulcan with Unax coolers.

All the raw materials must be shipped in by lake steamships to this plant

and so it is necessary to stockpile stone sufficient for winter requirements. The need for conservation of storage space as well as the desire for increased capacity and efficiency stimulated interest in the preheater. Factors considered which favored the use of a preheater were the handling and feeding of frozen chunks of limestone to the kiln, high fuel costs, availability of uniform sized washed stone and the desire for an improved product.

The preheater is directly below a stone storage bin of 250 tons capacity. The stone feeds from the bin into the preheater by gravity and then enters the kiln. In the lower section of the storage bin, there is a series of grates over which the stone passes and at which point moisture is removed from the stone by means of a moisture duct connected to the kiln gas exhauster fan. Temperature of the air and the limestone at the moisture duct is 120-150 deg. F. Heat passes from the rotary kiln into the preheater and a portion of this heat rises through the storage bin so that all stone feeding into the preheater is relatively dry.

Stone moves down through the preheater which consists of a series of grates at five levels, staggered to effect uniform distribution of the gases throughout the preheater. There are eight plungers feeding stone through six different spouts, which are step-type spouts so that the feed passes over a bed of stone. These spouts have been in service for 10½ years. The spouts converge to an alloy kiln feed spout.

Temperature of the limestone entering the kiln averages 1250 deg. F. and tests have indicated a surface calcination of 3 to 7 percent of CaO of the stone. Hottest point in the preheater is about 1500 deg. F. Exit gas temperature from the kiln averages 1500-1600 deg. F. and that from the preheater is 300-400 deg. F.

The preheater operates best when a portion of the kiln exit gases is bypassed, the figure ranging from 10-30 percent by-passed depending upon production of the kiln. Retention time of the stone in the preheater is about two hours. Draft loss in the preheater ranges from 3½-4½-in. w.g. The limestone exceeds 97 percent CaCO₃ and is in the ½- to 1½-in. size range.

Maintenance costs have averaged above five cents per ton of lime and result primarily from duct and grate repairs and replacement. A lime of extremely low core requirement (less than ½ of 1 percent) is produced with a heat requirement ranging from 5,400,000 B.t.u. per ton to 7,000,000 B.t.u. Greatest efficiencies are attained at a definite rate of production which incidentally far exceeds that for conventional kilns of the same size.

Lime is burned with a 14,000 B.t.u. coal, with 5-7 percent ash and 0.5-0.8 percent sulfur. At one time the installation ran 13 months without in-



Preheater installation on 9- x 175-ft. rotary lime kiln of Cutler-Magner Co., Duluth, Minn.

terruption and the average continuous run is eight months. Currently, it is anticipated that a kiln ring will build in 8 to 10 weeks, which is removed with 8-gauge kiln gun shells.

As to results with the preheater, Mr. LaLiberte said that estimated savings are about 20 percent when compared with operation when the preheater is by-passed. Capacity of the kiln was sharply increased, kiln control was improved and quality of lime improved as a result. The preheater has proved an effective dust collector and longer refractory life has resulted with the lower kiln temperatures.

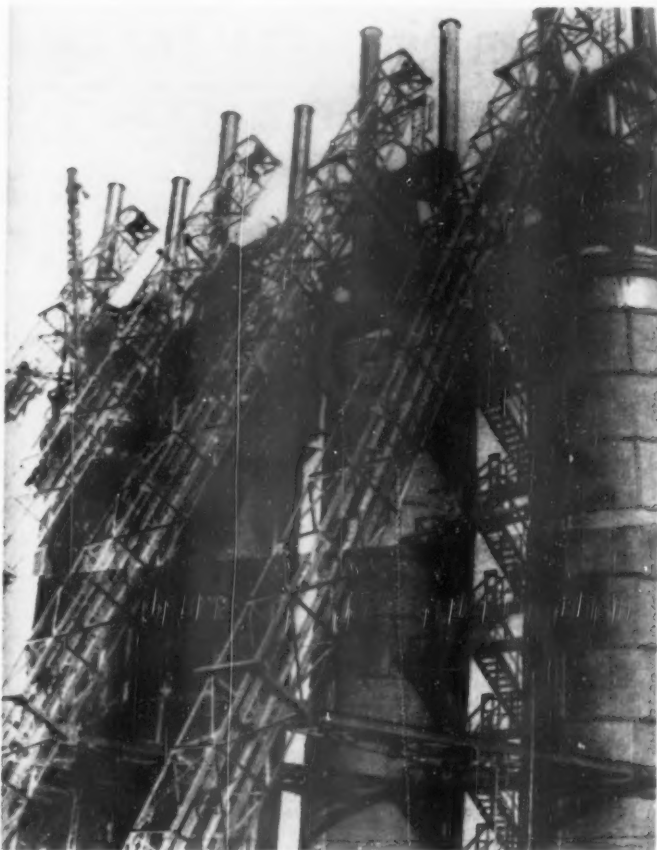
The company installed an 8 ft. 2-in. x 325-ft. Smith kiln at its Superior, Wis., plant in 1946, which has a quadrant preheater. Comparing the two installations, the efficiency is about the same. However, production from the longer kiln is not as great due mainly to its smaller diameter.

John Gaisford, Lee Lime Corp., Lee, Mass., then followed with a discussion of experiences with a 7-ft. 6-in. x 125-ft. rotary kiln with KVS preheater and cooler. Heat recovered from

the cooler is utilized in a direct-firing, air-swept, coal mill, the amount of heat put through the mill being automatically regulated according to dampness of the coal.

Mr. Gaisford detailed early experiences which have led up to present performance which is a production up to 100 tons of lime per day at a fuel ratio of 5:5 to 1. Size of stone is ¾- to 1½-in., top burning temperature is 2375 deg. F., temperature in the dust chamber is about 1200 deg. F. and 350 deg. F. at the stack when no gases are by-passed the preheater. With installation of the preheater and cooler, capacity has been increased approximately 20 percent and a saving of 40 percent in operating costs has resulted.

Following the panel discussion, Irving Warner, vice-president, Warner Co., Philadelphia, Penn., gave an informal talk on the subject of the value of heated combustion air. Mr. Warner's remarks were intended to present savings that may be effected through recognition of wasteful practices and general tightening up of



The newest German lime plant using mixed feed kilns designed by Dr. G. Seeger

operations for the maximum in fuel utilization. His remarks have been summed up since the meeting and are presented separately in the form of an article as part of this report.

Research

In a talk "Lime Calcination Research at M.I.T.," J. A. Murray, associate professor of materials, Massachusetts Institute of Technology, reviewed the scope of the National Lime Association program under his direction, for the benefit of new men who are unfamiliar with it, and he discussed progress to date.

The work under Professor Murray's direction is fundamental research and, as he pointed out, is contrasted to applied research in that it represents long-range study of a nature that must be collectively financed. He told of work during the past year done on the calcining of pure calcite, which was selected in order to eliminate the variable effects from impurities. The important finding was that the rate of heating up to the calcination tem-

perature had great effect on the activity of the lime. With slow heating, activity increased and the reverse was true with rapid heating. Retention time and maximum temperatures used were relatively unimportant in their effects on activity of lime.

Mr. Murray said that one producer has already applied this principle in actual practice and is getting improved results. The next objective is to develop information on the effects of impurities and, Mr. Murray believes, similar results will be obtained as with pure calcite. Samples of various limestones supplied by producers will be put through thermal analyses to determine similarities between them in order to set up classifications, each of which will be representative of a number in order to narrow down the study.

Thermal analyses reported earlier have shown large differences between Ohio dolomites and non-Ohio dolomites. The method of performing these analyses was described. In the case of the non-Ohio dolomites, at 750 deg.

F. temperatures, differentials showed up representing the decomposition of $MgCO_3$. The temperature then rose again and just before reaching 900 deg. F. fell again, representing $CaCO_3$ decomposition.

With Ohio dolomite, the temperature fell off several hundred degrees earlier showing an earlier loss of CO_2 . By adding salt to non-Ohio stone, the decomposition started at 400 deg. F. instead of 750 deg. F. and the temperature curve was similar to that for Ohio dolomites. Further experiment has been with various salts, particularly sodium chloride and calcium chloride, with similar results. Further study will be conducted with the x-ray spectroscopy as to the reasons for differing behavior in decomposition.

Palletized Shipments

Slides and colored movies were shown by David Cessna, Towmotor Corp., Cleveland, Ohio, to show mechanized handling of paper bags on pallets. Mr. Cessna said that each installation of palletized handling first requires a study of the customer's facilities and requirements in order to arrive at an efficient handling system.

The illustrations showed the use of fork-lift trucks in a variety of operations and also recent improvements and accessories for positioning and high stacking of loaded pallets.

Field Trips

An entire day was set aside for inspection of the limestone mines and plants of National Gypsum Co. and Warner Co. at Bellefonte. At each plant, the party was divided into small groups and taken down under the supervision of informed guides into the mines and throughout the plants. Engineering drawings and an itemization of equipment specifications together with a schedule to identify the various facilities were first supplied each individual. Much performance data was included in these guide sheets and the trips proved to be of extreme interest.

An article entitled "Value of Hot Combustion Air," by Irving Warner, rewritten from the author's talk at the lime convention, appears on page 82.

Canadian Mineral Report

THE CANADIAN DEPARTMENT OF Mines and Resources has published a report entitled "The Canadian Mineral Industry in 1947." In its 134 pages, the report covers in brief the metal, nonmetallic and fuel resources of the nation. The section on industrial minerals gives statistics and data on the output of more than 40 minerals.

According to the report, the Canadian cement industry experienced one of its best years in 1947. The value of production was the highest ever attained.

Value of Hot Combustion Air

By IRVING WARNER*

LIMESTONE BEGINS to calcine at about 1500 deg. F., although 1650 deg. F. is required for calcination below the surface. Hence, it is generally considered that heat in excess of 1650 deg. F. is valuable "high level heat" whereas heat below 1650 deg. F. is considered useless "low level heat." It is considered to be useless simply because there is a great excess of it beyond that necessary for preheating the stone. (Note: In the portland cement industry, it is customary to consider 1500 deg. F. as the dividing temperature).

However, in a rotary kiln, there is considerable difference between the temperature of the gases and that of the stone when the stone reaches 1650 deg. F. and calcination is beginning. In a normal short kiln with a ratio of 3 lb. of lime per lb. of coal, and exit gas temperature of 1500 deg. F., it is calculated that the gas temperature is 2100 deg. F. Even in a long, more efficient kiln, the temperature at the point of incipient calcination will usually be in excess of 1800 deg. F. Hence the heat below 1800 deg. F. is the low level heat useful only for preheating, and the heat above 1800 deg. F. is the high level heat valuable for calcination.

It is the low efficiency kiln that we wish to improve, so the valuable high level heat is only that portion above 2100 deg. F. One pound of average coal having a heat value of 13,000 B.t.u. requires 10 lb. of air for its complete combustion, producing 11 lb. of products of combustion. A large portion of the total heat must be utilized merely to raise the temperature of the gases to 2100 deg. F. before they have any value to effect calcination.

A practical way to visualize this matter, although quite unscientific, is to figure the temperature of the combustion gases if the heat of the coal were applied solely to raising their temperature. This figures to about 4500 deg. F. above the ambient air temperature. This is a phantom figure, never realized in practice, but is useful for this discussion.

Let us assume that the temperature of the ambient air is 100 deg. F. so the gases must be raised by 2000 deg. F. The work of doing this is $2000 \div 4500 = 44.5$ percent of the total heat in the coal. The heat valuable for calcining is then only 55.5 percent of the total heat.

Now suppose we could raise the

temperature of all the air of combustion, and of the coal itself, by 400 deg. to 500 deg. F. The phantom ultimate temperature becomes 5000 deg. The critical dividing temperature of 2100 deg. F. remains the same, although actually in practice it will be lower.

The combustion gases must now be raised only 2100 deg.—500 deg.—1600 deg. F., and the heat thus lost becomes $1600 \div 5000 = 32$ percent. This leaves 68 percent of the heat in the coal for the valuable calcination. As compared with the previous figure of 55.5 percent, this constitutes a gain of 24 percent. The kiln formerly operating at a fuel ratio of 3:1 would now operate at 3.72:1.

The source of such heat for the combustion air is naturally the heat in the discharged lime. Unfortunately, for the technique of lime burning, we have called coolers "coolers." The objective of engineers and operators alike has been to get the lime cool enough for subsequent processing or for shipment without burning a box car. The cooler should be a heat regenerator returning the heat to the kiln in the air of combustion with the desirable results outlined above. If this is done properly and effectively, then cool lime is obtained as a desirable by-product of this good technique.

How valuable is this heat which is put into the system on a low level basis but increases the percentage of high level heat? This writer believes it to be worth 100 percent in the calcination of lime. A kiln operating at a 3:1 ratio is only 33 percent efficient, so this regenerated heat is worth $3\frac{1}{2}$ times as much as the same heat from additional fuel. In a kiln having a ratio of 4:1, the regenerated heat would be worth 250 percent.

In the average kiln, the point in the kiln itself where the gases drop from high level to low level is roughly at the center of the kiln, further up for a hard driven short kiln and less than half for a long kiln. Any heat lost below this point constitutes a loss in the percent of the valuable high level heat. In the category of places where heat is lost, aside from the kiln shell itself, is included the hood (or end shield), hot lime chutes, radiation of the cooler and the final temperature of the lime itself.

If the lime were to be cooled regeneratively from 1800 deg. F. to 300 deg. F., there would be a saving of heat that would calcine 384 lb. of lime for each pound of lime produced. It would be an excellent cooler that would be 67 percent efficient. Hence the increment of lime, without fuel cost, would

be $.384 \times .67 = .25$ lb. and the kiln with a ratio of 3:1 would go up to 3.75:1.

This is an enormous improvement and cannot be fully accomplished in practice for the following reasons:

1. Even poor kilns already salvage considerable heat. A kiln operating entirely on cold air would more likely have a ratio of less than 2.5:1.
2. Coolers of the Unax type or rotary coolers under the kiln have a high radiation loss.
3. Tramp cold air leaks in at various points, or hot air leaks out or is deliberately allowed to escape.

Even with these technical difficulties, there are also important practical difficulties. Hot secondary air tends to accelerate combustion and shorten the flame to the detriment of lime and lining. The operating supervisor is inclined to say the kiln operates better on cold air. A purpose of this article is to convince the operator of the great value of this hot combustion air so that he will endeavor to work out the practical problems of its application.

The static cooler of intimate contact between lime and air is theoretically the best since it has high heat exchange rates and low radiation. Efforts along this line are being made. The operating difficulties are great, perhaps insurmountable in those plants that produce their own stone, and as such must handle varying size of product from time to time. The problem is easier at those plants which use purchased stone of one size only.

Any rotary cooler is a poor exchanger of heat. It has a high radiation loss that is difficult to control. But it has the advantage of passing uniformly and automatically the lime that it receives, regardless of quantity, sizing or grading. It is also a true counter-flow heat exchanger. The solution of the problem then lies along two lines of thought:

1. Make the static cooler controllable irrespective of quantity of lime and the size or grading of the particles, with avoidance of short-circuiting either hot lime or cold air.
2. Make the rotary cooler an efficient heat exchanger with greatly reduced radiation losses.

Unfortunately, designing engineers have been so engrossed with the problem of reliable equipment for cooling that the efficient regeneration of the heat to improve fuel economy has sufficed. Also the larger portland cement industry has naturally received the most attention. Rapid cooling of the clinker for improvement of quality is an important consideration. Clinker is a comparatively good conductor of heat and gives off its heat rapidly. It is abrasive and equipment must be made to suit.

The problem of lime is quite different.

(Continued on page 106)

*This article has been rewritten by the author from notes presented at the National Lime Association operating meeting.

MILLING AND CRUSHING EMPHASIZED AT A.I.M.E. BENEFICIATION MEETING

ON FRIDAY, SEPTEMBER 1, 1950, the fledgling Minerals Beneficiation Division of the American Institute of Mining and Metallurgical Engineers tried its wings by sponsoring its first regional meeting. Established as a new division in February, 1948, the group embraces mill men from both metallic and nonmetallic industries throughout the country. Through fortuitous circumstances, the division was able to hold its meeting the day following the conclusion of the highly successful American Mining Congress, Western Division, Metal Mining Convention and Exposition held in Salt Lake City, August 28-31. Since many of the over 5000 in attendance at the exposition also are A.I.M.E. members, no better time or place could have been selected.

The mill men actually opened festivities a day earlier with their now famous Scotch Breakfast in the White Maple Room of the Hotel Newhouse. Jack Myers, the "Sage of Copperhill, Tennessee," and first chairman of the division, presided as Honorary Chef. Everyone thinks he's a top flight mill man after one of these affairs which features a menu of orange juice, porridge, eggs, coffee and water all sweetened with Scotch.

Friday was devoted to technical sessions which opened at 9:00 A.M. in the Jade Room of the Hotel Utah. In all, eight papers were presented, four at the morning session and four in the afternoon.

The morning session, with Fred C. Bond of Milwaukee as chairman, was devoted to crushing and grinding.

Fine Grinding

The first paper, entitled "Fine Grinding in Pebble Mills at Lake Shore" was ably presented by Bunting S. Crocker of Lake Shore Mines, Ltd., Kirkland Lake, Ontario, Canada. The Lake Shore staff has run a series of long tests comparing pebble grinding with steel ball grinding and also comparing low discharge grate mills against high discharge trunnion overflow mills, with rather startling results. The low discharge grate mills showed an increase of 30-40 percent in tonnage with virtually no power increase. Mr. Crocker also mentioned that they experienced no blinding of the grates. Ball and pebble loads are carried almost to the center line and the Ni-hard grates give exceptionally long life.

In comparing pebbles and balls in a 5- x 16-ft. mill, the pebbles gave ap-

proximately 40 percent of the capacity attained with the balls. Further tests showed that a 6- x 8-ft. low discharge grate-type mill charged with pebbles gave the same tonnage as a high discharge 5- x 8-ft. mill charged with balls.

Pebble consumption was closely checked by batch weighing added pebbles through a Jeffrey Toledo scale. Pebble consumption in the 6- x 8-ft. low discharge mills averaged about 7000 lb. per 8 hr.

Rod Mills

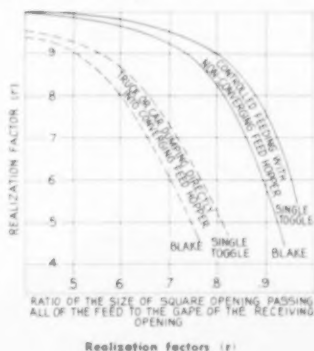
The next paper was "The Center Peripheral Discharge Rod Mill" by David P. Hale, Jr., Denver, Colo. Some of this paper had been previously published in the February, 1950, issue of *Rock Products*. The paper presented some recently accumulated operating data to show the close limits that can be maintained by a C.P.D. rod mill in meeting a given fineness modulus. Another set of data showed that when operating a 5- x 12 ft. mill at 26 r.p.m. at 30 t.p.h., the F.M. was 2.13, at 34½ t.p.h. it was 2.36 and at 39½ t.p.h., F.M. increased to 3.22, thus illustrating mill flexibility.

Based on 315 days of operation at a large government dam, an 8- x 12-ft. Marcy C.P.D. rod mill averaged 92 tons per hour and produced a sand having an average F.M. of 2.73. Rod wear was 0.95 lb. per ton of sand ground.

The paper suggested the possible future application of the mill on materials which slime easily or on very friable industrial minerals where fines are undesirable.

Jaw Crusher Capacities

The highly controversial subject of jaw crusher capacities was discussed



in an excellent paper by D. H. Gieskieng of Denver, Colo. The sub-title of Mr. Gieskieng's paper was "Blake and Single-Toggle or Overhead Eccentric Types." The advent of curved jaw crusher wearing plates made an approach other than segmental layout analysis desirable for prediction of capacities. For some time it had been known that the "drawing board capacities" of crushers using these plates had to be modified considerably by complicated experience factors to achieve agreement with field results. Because these apparent capacities could readily be increased several-fold by minor crushing shape changes, it was necessary that the utmost precaution be taken in predicting capacities of jaw plates modified for non-choking, special wear characteristics, or other reasons. The author made extensive laboratory and field tests on a Blake-type jaw crusher and summarized the results in a simple first degree equation applicable to crushers using either straight or curved jaw plates. The equation first outlines the maximum capacity potential of a given crusher and then reduces this figure in accordance with installation circumstances by means of a realization factor.

Tests were next made in single-toggle or overhead eccentric type crushers. It was found that the previously derived equation, with the addition of an eccentric throw factor, is applicable to standard types of single-toggle crushers as far as maximum capacity potential is concerned. However, these crushers have realization factor curves somewhat different from those outlined for the Blake type.

Equations

Blake type:

$$C = f \cdot d \cdot w \cdot y \cdot t \cdot n \cdot a \cdot r \dots (1)$$

Single-toggle type:

$$C = f \cdot d \cdot w \cdot y \cdot t \cdot n \cdot a \cdot e \cdot r \dots (2)$$

Where C is capacity in short tons per hour through the crusher

f is a feed factor, dependent upon the presence of fines in the feed, and the surface character of the jaw plates used.

Values of (F)

	Smooth Plates	Corrugated Plates
With normal fines	0.6000414	0.6000519
Fines scaled out	0.6000365	0.6000232
Large pieces only	0.6000312	0.6000215

d is apparent density of the broken product in lb./cu. ft. (If the true specific gravity of the feed is known, 40

percent voids may be assumed and d becomes 37.4 times $sp. gr.$)

y is the upside setting of the crusher in inches. In the case of corrugated jaw plates it is measured from the tip of one corrugation to the bottom of the valley opposite.

t is the length of jaw stroke in inches at the bottom of the crushing chamber. It is the difference between open and close side settings.

n is the r.p.m. or crushing cycles per minute.

a is the nip-angle factor. It is unity for 26 degrees and 3 percent greater for each less nip-angle degree. A nip-angle of 20 degrees has an a value of 0.88. Nip-angle measurement on curved plates is made at point where largest pieces in original feed are crushed.

r is the realization factor. It is unity for perfectly uniform choke feeding and usually less for actual operating conditions according to the method of feeding used and the probabilities of hang-ups involving the size of feed and crusher opening. Approximate values are given by the curves shown. The values are further reduced by intermittent feeding.

e is the throw or diameter of gyration of the single-toggle crusher eccentric in inches.

A paper entitled "A Calorimetric Method for Studying Tumble-Mill Grinding" by A. Kenneth Schellinger of Stanford University concluded the morning session.

Afternoon Session

John C. Lokken of Berkeley, Calif. was chairman for the afternoon meeting. Nathan M. Levine of the University of Wisconsin presented a paper dealing with concentration of low grade iron ore from the Western Geologic Range. "Some Characteristics of Sintering and Testing Iron Ores" was the subject of an interesting paper by F. M. Hamilton and H. F. Ameen of Negaunee, Mich. The use of the Dutch State Mines Cyclone for thickening and desliming flotation feed was described by Robert I. Kingman of Tahawus, N. Y., and the meeting closed with a discussion of an improved method of gravity concentration in the fine-size range by A. Thunauer and H. Rush Spedden. This last paper described work done on tin tailings in Bolivia using a Sullivan deck or tilting concentrator.

Raymond E. Byler of San Francisco deserves commendation for his work as chairman of the program committee, and he was ably assisted by Fred C. Bond. The division also owes much to the work of Norman Weiss of Salt Lake City on meetings and arrangements and to the tireless efforts of the secretary-treasurer, Will Mitchell, Jr., of Milwaukee, Wis. The authors are to be congratulated for their fine technical papers which made the meeting so successful. It is hoped that the Minerals Beneficiation Division will sponsor many more regional

meetings in the future. Such exchanges of ideas and experience greatly benefit the industry as a whole.

Present officers of the Minerals Beneficiation Division of the A.I.M.E. are Grover J. Holt, chairman; Raymond E. Byler, associate chairman; Edwin H. Crabtree, Jr., regional vice-chairman; Donald W. Scott, regional vice-chairman; and Will Mitchell, Jr., secretary-treasurer.

Metal Mining Convention Papers of Interest to Rock Products Producers

THE 1950 METAL MINING CONVENTION and Exposition of the Western Division of the American Mining Congress convened at the Fair Grounds in Salt Lake City, Utah, August 28-31. Some 5600 visitors from the United States and foreign countries gathered to see the greatest exhibit of machinery in the history of the Congress. A well-rounded program of speeches and two days of field trips along with entertainment completed the program.

More than 125 leading manufacturers of mining and allied equipment displayed their products in a gigantic show that required more than 36,000 net square feet of floor space, 50 percent more than the space occupied at the 1948 meeting. Many of the exhibits included full size operating equipment.

Most of the papers dealt with topics that would not particularly interest the readers of *Rock Products*, but there were several papers relating to subjects that are of interest.

Dual-Impact Breaker

The double-impeller, dual-impact breaker (formerly the New Holland crusher, now manufactured by Iowa Mfg. Co.) was discussed by A. C. Ensign of Salt Lake. In his paper Mr. Ensign gave data on a number of tests run on a 3020 breaker in a quarry near Salt Lake. In 79 operating days the breaker handled 18- to 24-in. quartzite and granite niggerheads and reduced them to minus 1½-in., minus ¾-in., minus ¼-in. and fines in closed circuit with a 3- x 10-ft. triple-deck vibrating screen. The feed rate was limited to 90 t.p.h. by screen capacity. With bars set at 1½ in. away from the impeller bars and with oversize from the screen returning to the breaker, average product was:

1½ in. material or larger, 10 percent
¾ in. material or larger, 25 percent
¼ in. material or larger, 45 percent
¼ in. material or under, 20 percent

Circulating load varied from 10 to 20 percent depending on feed size, and average power consumption was 75 hp.

Other tests were made on perlite, carnitite ore, lead speiss, rock asphalt, pumice and cinders with satisfactory results.

The author concluded by stating

Approximately 175 members attended the luncheon at the Hotel Utah. The speakers included A.I.M.E. President D. H. McLaughlin, past-president L. E. Young, and Dean Carl J. Christensen of the University of Utah. Roy E. O'Brien, newly appointed Western secretary of the Mining Branch, was introduced to the guests by Chairman Grover Holt.

that in his opinion the dual-impact breaker offers no complications as regards operation and has more flexibility than any known conventional crushers, but that complete success depends on the development of special alloys to reduce maintenance costs on highly abrasive ores.

Blasting Progress

Progress in blasting procedure was reviewed by Jack M. Ehrhorn of Salt Lake. The author noted progress in safety rules and regulations covering the care and use of explosives, increased use of ammonium nitrate and semi-gelatin powders, packaging of explosives in smaller cartridges for underground use and in larger cartridges for open pit use, Primacord with or without spacing, short-period electric delay caps, Ignitacord and connectors, positive spitting devices and stemming. Many operators have achieved substantial reductions in powder cost by rewarding their miners for powder savings.

Labor Relations

An interesting paper entitled "Labor Relations in Dollars and Cents" was given by Roy Hatch of Kennecott Copper Corp. He pointed out that many people fail to consider a labor contract beyond that portion which dictates the wage scale and therefore overlook the hidden costs imposed upon management by legislation, contract provisions or humanitarian aims.

Itemizing the extra items incident to labor, Mr. Hatch developed this table:

Item	Cost per Man Hour
Statutory overtime	12.5 cents
Shift overtime	3.4 cents
Shift differential pay	2.0 cents
Vacations	4.8 cents
Holidays	2.9 cents
Social security	1.8 cents
Unemployment compensation	1.5 cents
Workmen's compensation	1.7 cents
Medical, hospitalization & insurance	2.0 cents
Employee housing, eating and recreational facilities	2.1 cents
Total	35.2 cents

This gives 35.2c per hour or \$2.81 per eight-hour shift. Thus an employee receiving \$12 per shift in direct wages receives \$2.81 in addition as in-

(Continued on page 98)

"EUCS" Pay Off

for WYANDOTTE
CHEMICALS CORP.



At Alpena, Mich., Wyandotte Chemicals Corporation operates one of the world's largest limestone quarries — another job where "Eucs" are paying off by doing more work at less operating and maintenance cost.

Thirteen Rear-Dump Euclids of 22-Ton capacity replaced an electric haulage system for moving the rock from quarry to plant. Operating two shifts per day and six days per week, the "Eucs" haul approximately 800 tons per hour. The round trip averages $1\frac{3}{4}$ miles, with a maximum grade of 4 per cent. The "Eucs" are loaded with stone by shovels of 5 and 6 yd. capacity, and are used for removing overburden during winter months.

Wyandotte standardized on Rear-Dump Euclids because of their proved dependability and efficiency in mine and quarry operations. Their large capacity and fast travel speeds have increased production and lowered hauling costs at Alpena.

Euclid equipment has proved profitable for hundreds of owners on a wide range of off-the-road work. Your Euclid Distributor or Representative will be glad to discuss your requirements and show you how Euclids can do a better job for you.

The EUCLID ROAD MACHINERY Co., Cleveland 17, Ohio



EUCLIDS



Move the Earth



Lime kilns at the Kelley Island Lime and Transport Co.

Lime Kiln Operating Costs

By DR. JACOB O. KAMM*

IN 1945 THE KELLEY ISLAND Lime and Transport Co. was faced with the problem of replacing some of its existing lime kilns. The post World War II increases in wage rates and fuel costs directed the attention of the management, headed by Ralph L. Dickey, president, to the need for installing kilns having a greater operating efficiency than the traditional old-type shaft lime kilns.

After surveying possibilities for improvement and visiting many plants, the management recommended the installation of Azbe kilns and the board of directors authorized their installation. These kilns were completed in late 1946 and have now operated for over three and one-half years. The company's experience with these shaft kilns is presented here and has been made possible only through the management's willingness to make available its operating results.

type shaft kilns has declined slightly. Each Azbe kiln produces from five to seven times as much lime per year as the old-type kiln. The output per man-hour for the new kilns is exactly twice the output for the old kilns in 1947. The management's original expectation therefore has been substantiated in that less labor is needed per ton of lime produced.

With the increased tonnage produced per man-hour in the new kilns the plant cost per ton declined, as is indicated in the third column in the table. The first year's operation found the new kilns much more expensive to operate per ton of lime produced than the old-type kilns. But subsequent years have seen the operating efficiency of the new over the old kilns continue to widen. Today the company operates the new kilns at a lower per ton plant cost than it had for lime in the old kilns in 1937. In the meantime

Comparison of new kilns with old-type shaft kilns for the years 1947 to 1950

Year	Tons per man-hour (1947 old-type shaft kiln = 100)		Plant cost per ton	
	New kilns	Old-type kilns	New kilns	Old-type kilns
1947	81.7	100.0	186.3	100.0
1948	119.5	94.4	114.4	124.6
1949	177.7	95.1	100.0	143.5
1950	200.0	94.4	96.2	130.3

The first two columns comparing the tons per man-hour produced in the two types of kilns (on a relative basis) show that the output of the new kilns has continually climbed over the three and one-half years portrayed in the table while the output of the old-

type kilns have become more expensive to operate as a result of rising coal and labor costs.

Operating efficiencies that could be achieved were not immediately obtained from the Azbe kilns. Experience is required in order to obtain the proper operating conditions. The Azbe kilns use producer gas as fuel. This is generated from a gas producer. Experience has indicated the desired com-

binations of gas, stone, time and other variables in order to increase efficiency. By the second year of operation the per ton plant cost was less than that of the old-type kiln.

Besides the lowering of production costs through increased efficiency obtained from experience, two other factors have made the advantage of Azbe kilns over the old-type kilns in the production of lime greater than that which existed in 1946 when the kilns were constructed: (1) labor costs have continued to rise and, (2) fuel costs have increased. Since the advantages of the new kilns are in labor and fuel efficiency, the production cost advantage of the Azbe kilns is expected to increase even further.

The current inflationary rise in production costs will certainly call attention to ways and means to reduce operating expenses. The new kilns described here illustrate how one company has effectively reduced costs.

Readers are referred to an article on installation of kilns with center and side burners, published in the November, 1949, issue of ROCK PRODUCTS, pp. 66-69.

Plant Expansion

IDEAL CEMENT Co.'s Superior, Neb. plant is adding a \$500,000 finish grinding unit which will supplement the present finish mills. The mill is to be housed in a monolithic concrete structure and will include modern grinding, conveying, air separation and dust collecting equipment similar to that in the ideal plants at Devil's Slide, Utah, and Portland, Colo. The structure will be enlarged to house an additional finish mill and raw mills when sufficient power becomes available.

Atomic Energy Reports

U. S. ATOMIC ENERGY COMMISSION recently announced that complete files of non-secret atomic energy reports are to be made available to the general public. Complete sets of atomic energy declassified and unclassified research reports are to be placed in 31 American libraries which are located near major centers of scientific and industrial activities. In agreeing to be named as a depository, each library must provide access to the reports, reference service with regard to them, and photo copies to users in accordance with its established prices.

At the present time there are approximately 3500 reports in a full set and about 1500 new reports are issued each year.

Large Cement Contract

CONTRACTS for the construction of Canyon Ferry dam in Montana have been awarded to Ideal Cement Co., Denver, Colo., for 280,000 bbl. of portland cement at \$980,000 and to Combustion By-Products Co., Chicago, Ill., on its bid of \$31,640 for 22,600 tons of fly ash to be used as a pozzolan.

*Director, School of Commerce, Baldwin-Wallace College, Berea, Ohio

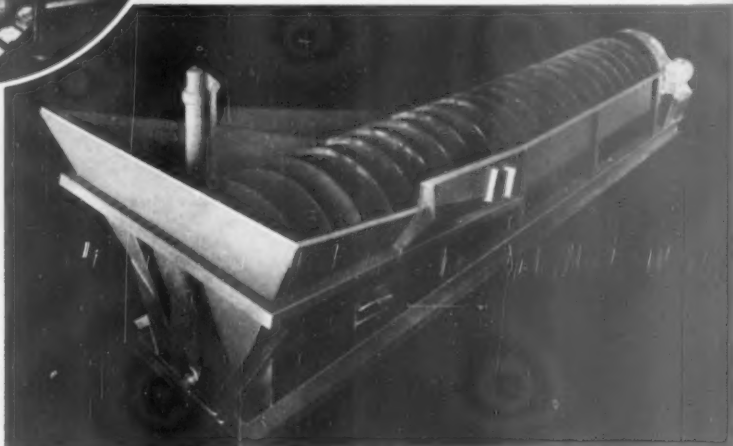
*First six months of 1950
Source: Company operating records.



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Fifty Years a Producer

(Continued from page 53)

Sam Fowlkes, New Orleans, La.; N. J. Fredericks and wife, Detroit, Mich.; Phil Gemmer and wife, Houston, Texas; Paul C. Graham and wife, El Monte, Calif.; Miss Virginia Guerin, San Francisco, Calif.; J. Rutledge Hill and wife, Dallas, Texas; R. K. Humphries and wife, San Francisco, Calif.; Herbert Jahneke and wife, New Orleans, La.; Howard W. Jordan, Port Washington, N. Y.; Walter M. Keeler and wife, Wichita, Kan.; Frank L. Kelly, New York, N. Y.; M. G. Kerr and wife, Detroit, Mich.; Wayne W. King, Cleveland, Ohio; Harold M. Lacy and wife, Dallas, Texas; Gene M. Mason and wife, Waterloo, Iowa; Robert Mitchell and wife, Los Angeles, Calif.; Wm. Moore and wife, Boston, Mass.; John W. Murphy and wife, Spokane, Wash.; H. F. G. Pelsue, Columbus, Ohio; Frank Penepacker, Portland, Ore.; T. E. Popplewell and wife, Ft. Worth, Texas; Robert F. Porter and wife, Towson, Md.; Nathan C. Rockwood, Chicago, Ill.; Eric C. Ryberg and wife, Salt Lake City, Utah; Eric W. Ryberg and wife, Salt Lake City, Utah; Louis C. Schilling, Miami, Fla.; F. E.

Schouweiler and wife, Ft. Wayne, Ind.; Albert R. Shiely and wife, St. Paul, Minn.; Alfred H. Smith, wife and daughter, Branchville, Md.; H. N. Snyder and wife, Buffalo, N. Y.; Eugene Sundt and wife, Albuquerque, N. M.; Harry F. Thomson and wife, Chicago, Ill.; W. E. Trauffer, Chicago, Ill.; Ray V. Warren, Pittsburgh, Penn.; Clarence Waterfall and wife, Ogden, Utah; R. E. Weaver and wife, Lincoln, Ill.; Vincent P. Ahearn, Washington, D. C.; Stanton Walker, Washington, D. C.

Entertainment

The entertainment provided for the occasion was in keeping with the character of the gathering. There were, of course, group breakfasts, luncheons and dinners, the members of the associations having exclusive use of the Lodge dining room for all occasions. There was as usual a get-together cocktail party each evening before dinner. Special features included a ride on the ski lift to the top of the highest mountain in the locality and an outdoor barbecue dinner. Thus the members and their guests were enabled to see a new and interesting part of the country.

CEMENT SHORTAGE AND QUALITY

Discussed at meeting of directors of National Ready Mixed Concrete Association

ALL OF THE MEMBERS of the Executive Committee and 18 of a membership of 23 of the Board of Directors of the National Ready Mixed Concrete Association attended the semi-annual meeting at Sun Valley Lodge, Idaho, on September 25 and 26. The meeting on the 26th was held jointly with the Board of Directors of the National Sand and Gravel Association. Together with ladies, children and guests, the entire group numbered close to 100 persons.

Wm. Moore, president and chairman of the board, opened the meeting with a brief address which emphasized the continued growth of the association and the industry it represents. There were, he said, 53 new members since the Chicago convention last winter, making 435 present active members, who probably constitute more than 75 percent of the country's annual production of ready-mixed concrete. He concluded by stating that the international situation and the government controls which result therefrom proved more than ever the necessity for the present adequate organization of the industry.

V. P. Ahearn, executive secretary, in discussing his financial report, said it was desirable for both the association, and the member companies in their own businesses, to go on record now with their intentions in respect to merit increases of wages and salaries

for the coming years. He said there might be a sudden freezing of these, and unless employers could show that such increases were a part of their scheme for keeping their organizations efficient and intact there might be some trouble in getting them approved later.

Future Exhibits

Wayne W. King, representing the Manufacturers Division, reported that the exhibitors at the national conventions of the association and the National Sand and Gravel Association in Chicago last winter were much pleased with the attendance and the interest shown. He said if these exhibits grow much larger they will outgrow any present hotel facilities. Later, when discussing convention programs, there was some consideration given to the possibility of holding conventions of all the aggregate industries in the same city, the same week, at different hotels, with exhibits held elsewhere; for example, in the case of Cleveland, at the Municipal Auditorium. Something like that will come if the exhibits get bigger and better.

Operating Problems

V. P. Ahearn discussed the vital importance to the industry of carrying on conscientious safety programs. He told, as an illustration, of a recent accident in Washington, D. C., in

which a large mixer truck ran down and killed a woman getting off a street car. Subsequent police investigation showed that faulty brakes were chiefly responsible. The company operator had left the determination of the condition of the brakes to the truck driver. It should be the especial responsibility of a truck maintenance department.

An insurance plan has been prepared and submitted to the Board of Directors to provide group life insurance for employees of the various operating companies. It is designed especially for the smaller producers, in order that they may buy such insurance at rates comparable to large business organizations. Further studies will be made before it is submitted to the industry. There appeared to be considerable interest in such a plan. The same idea was also brought before the board of the National Sand and Gravel Association.

Stanton Walker, director of engineering, covered various items on the agenda with reference to operating problems and research. He suggested that a trial be made in convention programs of inviting representatives of manufacturers of machinery and equipment to read papers on processing or on types of equipment on which they were especially well informed. Hitherto, the manufacturers themselves have been against any one of their number being given such prominence, but this attitude appears to have changed.

The manufacturers of truck mixers and agitators, through their Truck Mixer Manufacturers' Bureau, have a joint committee with the National Ready Mixed Concrete Association which is making some progress on standardizing equipment for highway use. Mr. Walker mentioned the current Maryland highway pavement tests with loaded trucks of various capacities, which probably will have much influence on the design of large truck mixers. He said the association's "Drivers' Manual" has been completed and is about ready for distribution. This book is intended to make the truck drivers courteous and agreeable representatives of their companies, as well as efficient operators of truck mixers.

Mr. Walker said that the association's annual fall "short course," for concrete technologists and salesmen, had grown so popular that it would probably be necessary to confine it to members of the industries. Hitherto it has been open to engineers, architects and any other interested persons. At the association's laboratory, at the University of Maryland, a fellowship study on the "compatibility" of aggregates is being completed.

Cement Shortage

The undertone of the discussion on operating problems was criticism of the portland cement manufacturers for their failure to recognize the im-

(Continued on page 56)

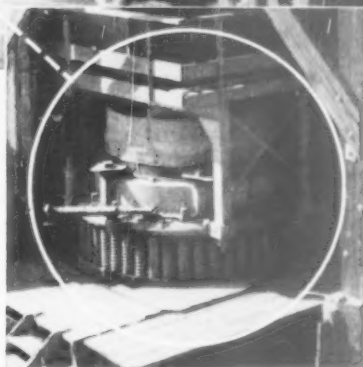


Consolidated Rock Products Company produces 350 tons of fine aggregate per hour with 3 SYMONS CONES

Consolidated Rock Products Company utilize one 7 ft. and two 4 ft. Symons Cone Crushers at their Sun Valley, California, plant, producing fine aggregate at a capacity of 350 tons per hour. Referring to this operation, the statement was made recently that Symons Cones could not be "beat" for secondary crushing.

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• Here is a close-up of one of the three Symons Cone Crushers installed at the Sun Valley, Calif., plant of Consolidated Rock Products Co. This experienced operator has a total of 17 Symons Cones installed in several west coast plants.

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Wet vs. Dry Process

(Continued from page 73)

materials the minimum water content in the slurry, permitting undisturbed passage through the chain zone, is higher than otherwise necessary for the grinding, pumping and blending operations. The use of weaker chain links increases the danger of rings, while heavier chains may exercise a grinding influence on the nodules formed in the second half of the chain zone, causing uneven flow of material in the kiln with the accompanying well-known troubles.

Factors in Clinker Burning

The formation of nodules is one of the most important conditions in any type of rotary kiln for the proper burning of cement clinker. Correctly sized nodules permit the passage of hot gases within their interstices while their large active surface is changing continuously due to the rotation of the kiln, which leads to a uniform absorption of heat. Plastic raw materials, producing relatively resistant nodules, also reduce the amount of dust from the kiln.

In the old fashioned dry process kilns, the raw mix is fed into the kilns in pulverized form. In these kilns not only the excessive dust loss must be considered, but the inefficiency of heat transfer as well. The powdered material in the kiln presents a relatively small active surface for heat transmission from the hot gases and the kiln walls, due to the close packing of the particles, and below this small surface is a well insulating bulk of material into which heat penetrates at a very low rate under the conditions prevailing in the kiln. In these dry process kilns, nodulizing will start late, far back in the calcining zone when the material is getting sticky due to incipient fusion of the flux-containing parts of the raw mix.

It is evident from the above, that in comparing a rotary kiln equipped with a chain system with a dry process kiln using pulverized feed, the wet kiln is definitely to be preferred due to its better nodulization and heat transfer, indicating that most of the heat needed for the evaporation of water in the wet process kiln would, in the dry kiln, escape through the kiln stack with the flue gases at higher temperature.

However, the comparison looks different if nodules can be produced independently from the kiln, with much less water than necessary to produce slurries. By using nodulized feed, the kilns used could be much shorter than wet process kilns and also more economical if means could be found for convective heat transfer in the preheating zone.

The Lepol kiln was the first semi-dry process kiln using nodulized feed, achieving excellent heat economies by combining a short rotary kiln with a traveling grate. The gases passing from the short rotary at approximate-

ly 1000 deg. C. are drawn through a layer of nodules, slowly traveling towards the feed end of the rotary on the grate. The temperature of the gases passing the nodules on the grate drops to about 160 deg. C., which is the best proof for the soundness of this combined heat transfer operation, from the viewpoint of fuel utilization. However, the grate has to be water cooled. If its slots become worn out, the spillage of nodules increases, which means considerable maintenance. Besides, the combination of a short rotary kiln with the traveling grate represents much greater capital expenditure than that required for a corresponding size wet process kiln.

The burning of clinker mainly by convective heat transfer in one operation on the grate only, using recirculated clinker as a protective layer on the grate, is still in the experimental stage, though two plants are in operation, one in Bavaria and another in Poland.

All these kilns were equipped with rotating drum-type nodulizers, using fine water spray to produce nodules with 10-12 percent water. These nodulizers required skilled men for continuous attendance, men who had to have considerable experience in adjusting raw mix feed and water spray so as to achieve the correct type nodules. This made the nodulizer quite an expensive operation.

The use of nodules, however, opened up new possibilities of simplifying convective heat transfer in the preheating zone of the rotary kilns, thus avoiding the complication of combination with a traveling grate. As stated before, nodules present a relatively large surface for heat transfer without the danger of clogging and choking up of the kiln as in the case of slurries. Thus the right type heat exchangers, effecting a more intimate blend of the nodules with the kiln gases, would become more effective.

Very skillful use has been made of this by Gygi, who introduced steel lifters into the preheating zone, not unlike turbine blades, forcing the gases along the steel surfaces where they blend thoroughly with the oncoming nodules. Four or five sets of Gygi lifters in the preheating zone of a rotary kiln reduce exit gas temperature to 160-180 deg. C., thus achieving nearly the same result as the combination with a traveling grate, at much reduced costs and with a simpler operation.

There are several plants operating in Switzerland with Gygi lifters, with outputs of 220-250 tons of clinker per day from 180-240-ft. kilns at a heat consumption of 2000-2100 B.t.u. lb.

It is evident from the above that semi-dry process rotary kilns, using nodulized feed with heat exchangers of improved design, produced kiln fuel economies which were very much better than those achieved by the most up-to-date wet process rotary kilns. Table I compares their respective efficiencies. In addition, the following

advantages must also be considered for the semi-dry process:

- (1) Much less capital expenditure for the shorter kiln per unit production
- (2) Improved quality of clinker due to less ash content
- (3) No slurry rings or similar obstacles in the preheating zone
- (4) Less sulfur corrosion in the preheating zone due to less moisture content, the lower moisture of the exit gases also causing less maintenance costs if the kiln works with an electrostatic dust precipitator.

Notwithstanding the advantages of the semi-dry process kilns, the wet process rotary kilns have been able to maintain their dominating position for many years. However, there are strong arguments in favor of the semi-dry process kiln:

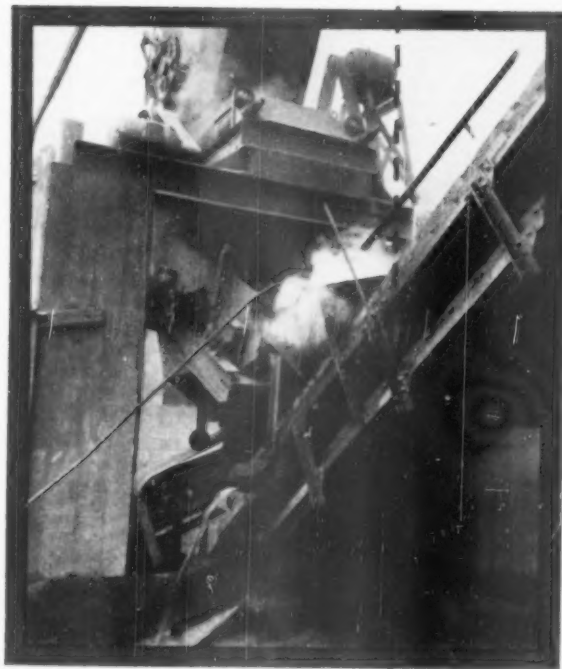
(1) In open-circuit grinding, wet grinding of the raw materials proved to be more economical and required less capital expenditure than dry grinding. There is no dust nuisance with wet grinding. However, the comparison looks different if it is based on closed-circuit grinding with a moving vane separator, as the capital expenditure for closed circuiting in the wet process is much higher than that of a corresponding size plant for dry grinding, which may also have the additional advantage of drying and grinding in one operation. The power consumption, however, will be slightly higher for dry than for wet grinding.

(2) For semi-dry process kilns, the raw material has to be dried prior to its grinding, and wet in the nodulizer again with 10-12 percent water.

If the moisture content in the raw materials is not excessively high, the amount of fuel for drying raw materials is negligible in comparison to the saving effected by the use of nodules in shorter kilns. For instance, let us assume that the raw materials are hard limestone and clay, and the secondary crushing of limestone is done in the plant area under roof. Assuming excessively wet conditions, the extreme moisture contents in the clay may reach 20 percent which, together with the slight moisture retained in the limestone may correspond to about 5 percent in the raw mix, thus necessitating 0.9 lb. of British Standard coal per 100 lb. of clinker for the evaporation of water under ideal conditions. Assuming an efficiency of only 30 percent for drying, the necessary amount of British Standard coal for extremely wet conditions would be about 3 percent against the saving of 9-10 percent with the semi-dry process.

(3) The conveying and blending of slurry in well designed plants has in the past proved to be more economical than the corresponding operation with pulverized raw mix. But recently much progress has been made in the conveying and blending of pulverized materials. Already in the early 30's porous silica pads were produced which

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ROCK PRODUCTS, November, 1950

served as a backbone for blending to the required chemical composition. These pads permit the passage of air through narrow channels at a much reduced pressure which, however, is sufficient for increasing the distances between the particles of the pulverized material and eliminate those nuisance attraction forces which make proportioning, discharging and conveying of dry materials without air so troublesome. Recently these methods have been developed further and today it is no problem to change over pulverized substances in bulk into the "fluid" state, in which they almost behave like real liquids and their blending, feeding and conveying possibilities become equal to that of slurries. The consumption of air compares favorably with that used for slurry agitation.

Dry raw mix can most conveniently be handled in silos of 300-500 tons, with the latter figure representing the maximum desired capacity. This is a disadvantage in comparison to the wet process as there is practically no limit to the size of the slurry containers used.

(4) The costs and the necessary attendance of the rotary drum-type nodulizers were a considerable burden to the semi-dry process plant. But here too, there has been much progress in recent years. Based on the possibility of securing an even flow of raw mix pneumatically, a new type of nodulizer has been developed which is inexpensive and does not require any attendance.*

Process Advantages

With all these improvements we predict that in the cement industry of the future there will be more interest in the semi-dry process due to its many advantages over the wet process, with the exception of those plants, which have to consider moist and soft raw material deposits washable to slurry with little or no grinding. Another case for the wet process is for exceptionally large cement plants where the large number of relatively small silos and auxiliary equipment would more than outweigh the advantages of the semi-dry process. But for plants up to 500 tons daily capacity it appears that there are overall advantages in comparison to a corresponding size wet process.

The recent increase of fuel and equipment prices changed the comparison even more in favor of the semi-dry process plants. In areas where the soil is deficient in limestone, the use of pulverized raw mix opens up several possibilities for a new cement plant, as for instance the grinding of agricultural limestone, on which account the raw grinding capacity of a new plant could be in excess of that required by the kiln. By such an excess capacity of raw grinding, the

first and most important step towards the future capacity increase of the plant is done. Furthermore, the use of pulverized raw material and a modern type nodulizer increases the capacity of the plant by installing a modern vertical kiln, working on the same nodulized feed, thus without any complications due to the difference in types of kilns in one plant. As explained in a previous article in *Rock Products*,† the economy of a shaft kiln cannot be surpassed by any other known kiln system, while its design and erection is an inexpensive "home job" and can be accomplished in a small space, at relatively low expense, and in a short time.

Labor Relations Trends

(Continued from page 41)

employing them. The purpose of the Building Trades Council was to render the particular job all union. It was not to require the electrical subcontractor to unionize his shop located elsewhere, or to bring pressure against the primary contractor at any other place because of the employment of this subcontractor on this one job. Accordingly the object was not in any literal sense to require the contractor to cease doing business with the subcontractor. The pressure was limited to the one job, which was picketed as a whole to make it wholly union and in protest against the employment there of the non-union electricians.

The text of the decision continues: On all cases (cited) where an unfair labor practice was held to have occurred, the object was to bring pressure on the employer with whom the union had its dispute by the "conscripting of innocent neutrals," an activity that Section 8 (b) 4 (A) is devised to prevent. In each case the location of the strike was entirely separate from that of the concern against which the ultimate pressure was sought to be directed. The action of the employees (in those cases) was not against the job where the non-union men were employed, as in the case at the bar. The Court went on to explain the N.L.R.B. itself had not been consistent in more recent cases which were similar.

The Court then described the object of the picketing (strike) in the case before the bar thus: The contractor was not neutral. He brought in the subcontractor with his non-union labor. This act brought the contractor into direct controversy with the Building Trades Council. The picketing was designed to change the situation by bringing about the employment only of union labor on this job. There was no geographical separation at that location between the contractor and the subcontractor. Only by ceasing work for the contractor could the union members avoid working with the subcontractor's non-union men. The union employees of the contractor did not say in effect: "We will not work for you

if you do business with this subcontractor. They said, in effect: "We will not work with non-union men, and therefore we will not work for you at the place to which you bring this subcontractor with non-union men." The Court thought this action of the union members was of primary character even if they envisaged it might result in a cessation of work on this particular job by the subcontractor.

The Court decision continues: We do not read the Act as specifically providing against a strike based on labor conditions at the struck premises brought about by the activities of the principal contractor as well as of the subcontractor. If the picketing was directed against the subcontractor it was primary as to him. Its effect on others at the job would not change its character. If it was aimed at the principal contractor through employees of other subcontractors or through his own employees, it was aimed at conditions at the site of the picketing for which the principal contractor was at least in part responsible. This also would be primary action. The Court thought, therefore, that the picketing must be considered as against both contractor and subcontractor—inseparably; and that its object was to bring the job to a standstill until the non-union electricians were replaced.

* * * To require the contractor to cease the interwoven activities that the close relationship between him and the subcontractor involves, leaving him free to buy goods from the subcontractor, sell to him, and employ him in other locations, is not to require him to "cease doing business" with the subcontractor.

One of the three judges dissented in part and concurred in part. He did not agree that such a local building operation affected interstate commerce within the meaning of the Act. He also believed the decision of the District Court at Denver rendered the matter *Res Judicata*.

Tests Perlite As Glaze

PACIFIC STONEWARE CO., Portland, Ore., has announced that its first tests in using perlite as a substitute for feldspar in a ceramic glaze on stoneware jars have been satisfactory. The perlite was supplied by the Oregon State Department of Geology and Minerals Industries. It was found that this particular perlite does not give a dead-white colored glaze, but gives a faint yellowish tinge due to the small amount of iron present. It was also stated that the perlite glaze is much lower in cost, requiring only one firing in this work, instead of the two required in the feldspar glaze.

Sand Plant Expands

DODGE CITY SAND CO., Dodge City, Kan., has expanded operations with the purchase of 60 acres of land adjoining its present site.

*Dwight-Lloyd system, based on patents of F. Wendeborn.
†"Burning Cement in Shaft Kilns," *Rock Products*, September, 1950, p. 113.



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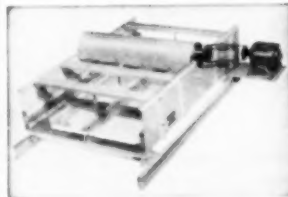
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McNary Dam

(Continued from page 76)

stream from Umatilla, and 190 miles above Portland, Oregon. The dam will provide slack water navigation for 67 miles in the Columbia and Snake rivers. The job includes relocation of 82 miles of railroad and 24 miles of state highway. Roughly 400,000 acres of land in Oregon and Washington have been found feasible for irrigation from the reservoir. The flow of the Columbia river ranges from a low of 100,000 cu. ft. per second to a high of 1,200,000 c.f.s.

delivered to the stockpile, must have a fineness modulus of not less than 2.40 nor more than 2.90.

The tolerance allowed for the various sizes as well as percentages of coarse aggregates needed are indicated below:

Personnel

For the McNary Dam Contractors, John H. Morton is project manager; Charles F. Ewing, business manager; Vern A. Glascock, project engineer; Bill Rives, concrete superintendent; Joe Demo, batching plant foreman; and Al Chaussee, excavation superin-

Table I

U. S. Std. Sieve Designation	Square Mesh Retained on No. 4	Percent by Weight		
		Minimum	Maximum	
No. 4	8	0	5	
8	16	5	15	
16	30	10	20	
30	50	20	30	
50	100	30	40	
100		40	50	

Table II

U. S. Std. Sq. Mesh	Percent by Weight Passing Individual Sieves			
	No. 4 to 1/2 in.	1/2 in. to 3/4 in.	3/4 in. to 1 in.	1 in. to 1 1/2 in.
1 in.				100
3/4 in.				100
3/8 in.			90-100	100
2 in.			20-55	0-15
1 1/2 in.		90-100	0-10	0-5
1 in.		20-45	0-5	
3/4 in.	90-100	0-10		
3/8 in.	30-55	0-5		
No. 4	0-5			
Separate Size Groups				
No. 4 to 1/2 in.				
1/2 in. to 3/4 in.				
3/4 in. to 1 in.				
1 in. to 1 1/2 in.				
1 1/2 in. to 2 in.				
2 in. to 3 in.				
3 in. to 6 in.				
Estimated Percentage of Total Coarse Aggregate				
16-28				
18-30				
27-39				
15-27				

Following is a summary of the project data for the McNary dam and locks:

Overall length of dam: 7400 ft.
Maximum height, headwater to tailwater: 92 ft.
Length of normal pool: 59 miles
Spillway length: 1310 ft.
Maximum height, foundation to deck: 158 ft.
Navigation lock, maximum lift: 92 ft.
Navigation lock, width: 86 ft.
Navigation lock, net clear length: 675 ft.
No. of power units: 14.
Installed capacity: 980,000 kw.

The Washington and Oregon abutments of earth and rock fill total 3120 ft. in length. The rest of the dam's length, totalling 3280 ft., is of concrete and comprises locks, fish ladders, spillway, concrete wings and gates of the dam proper for both the Washington and Oregon sides.

Aggregate Specification

Gradation of the fine aggregate is indicated in the following tabulation taken from the specifications:

In addition to the grading limits shown above, the fine aggregate, as

tendent. The Guy F. Atkinson Co. has offices in the Cascade Building in Portland, Ore., with Roy H. Northeutt vice-president in charge. All other personnel mentioned have their offices at the job.

For the U. S. Army Corps of Engineers, Sam Neff is resident manager and Frank Lee is field engineer. McNary dam is directed from the Walla Walla, Wash., office of the Corps where Col. William H. Mills is district engineer.

Col. O. E. Walsh is in charge of the Portland district for the Army Engineers and contracts let so far have been from his office.

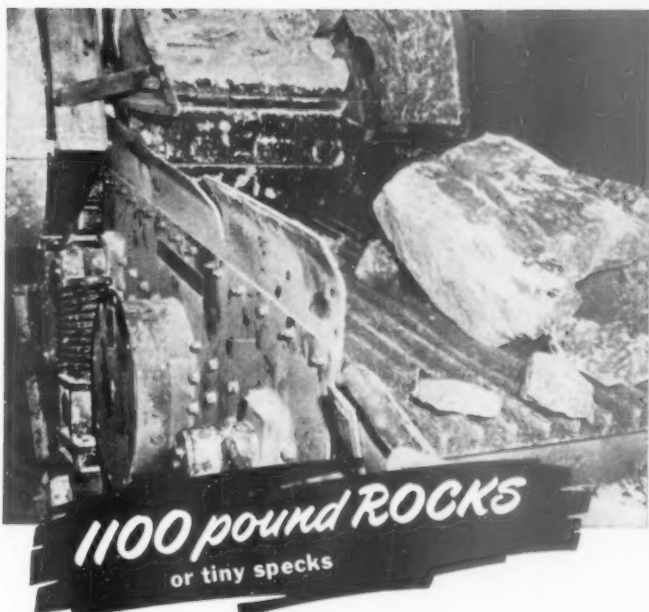
Canadian Limestone

PRODUCTION OF LIME in Canada during 1949 amounted to 1,018,823 tons valued at \$11,309,820 compared with \$10,655,062 from 1,053,384 tons in the preceding year, according to the annual industry report issued by the Dominion Bureau of Statistics. Output of quicklime was 798,187 tons, and of hydrated lime, 220,836 tons, against 850,043 and 203,541 tons, respectively, in the preceding year.

Perlite Convention

(Continued from page 74)

E. A. Curran, AirLite Processing Co., Scottsburg, Ind.
 Palmer G. Craig, Cleveland Gypsum Co., Cleveland, Ohio
 R. M. Crawford, Crawford Sales Co., Nashville, Tenn.
 Victor R. Dicken, Panacalite Perlite Co., Kansas City, Kan.
 M. C. Dailley, U. S. Gypsum Co., Chicago, Ill.
 E. F. Dillon, Alexite Eng. Co., Colorado Springs, Colo.
 Robert E. Dornow, F. E. Schundler & Co., Joliet, Ill.
 Cooper C. Drury, Perlite Products Corp., Dallas, Texas
 J. H. Ellerbeck, Utco Products Co., Salt Lake City, Utah
 Lyman C. Feeney, Panacalite Perlite Co., Pittsburgh, Penn.
 W. J. Franklin, Panacalite Perlite Co., Pittsburgh, Penn.
 Myron Gillette, Temple Perlite Co., Salt Lake City, Utah
 C. H. Goodhall, Practical Builder, Chicago, Ill.
 O. N. Gregg, Gregg Products Co., Grand Rapids, Mich.
 P. E. Harth, Texas Perlite Co., Fort Worth, Texas
 B. S. Howell, Jr., Tennessee Products & Chemical Corp., Nashville, Tenn.
 David Hagenbuch, Progressors Architecture, Chicago, Ill.
 S. W. Johnson, Texas Panacalite Co., Irving, Texas
 Edward L. Jones, Midwestern Perlite Co., Oklahoma City, Okla.
 George W. Katterjohn, Katterjohn Concrete Products, Paducah, Ky.
 P. Kelley, Ozark-Mahoning Co., Tulsa, Okla.
 J. C. Kingsbury, F. E. Schundler & Co., Joliet, Ill.
 Ernest Kretschmar, Texas Perlite Corp., Ft. Worth, Texas
 E. L. Kroon, Johnston Mfg. Co., Minneapolis, Minn.
 King C. Laylander, Panacalite Pacific, Los Angeles, Calif.
 Harry E. Lewis, Great Lakes Carbon Corp., New York, N. Y.
 W. M. Lomas, Muchleisen Perlite Process, Ft. Worth, Texas
 Lewis Lloyd, Alstair Construction Co., New Orleans, La.
 C. H. Luedemann, AirLite Processing Corp., Scottsburg, Ind.
 Frank L. Marcon, Duggan & Marcon, Inc., Albiontown, Penn.
 Howard Mason, Buffalo Perlite Corp., Buffalo, N. Y.
 W. C. Maxey, Texas Perlite Corp., Ft. Worth, Texas
 E. J. Mayhew, Perlite Products Inc., Arcadia, Calif.
 Dwight McClure, Great Lakes Carbon Corp., New York, N. Y.
 Tom E. Mendius, Silbrics Corp., Chicago, Ill.
 W. L. Morrison, Jr., American Birlork Co., Chicago, Ill.
 M. J. Mulvihill, Panacalite Perlite Co., Pittsburgh, Penn.
 John B. Murchick, Perlite Corp., Tempe, Ariz.
 M. H. Nabors, Tennessee Products & Chemical Corp., Nashville, Tenn.
 Bror Nordberg, Rock Products, Chicago, Ill.
 Jack A. Portmann, Precast Slab & Tile Co., St. Louis, Mo.
 C. W. Potts, Minnesota Perlite Corp., Minneapolis, Minn.
 Byron A. Ray, Utah Perlite Products Co., Salt Lake City, Utah
 V. M. Samuels, Panacalite Perlite Inc., Kansas City, Kan.
 Harold P. Santos, Texas Perlite Co., Ft. Worth, Texas
 R. H. Schabo, Midwest Perlite Co., Appleton, Wis.
 Fred Seitz, Buffalo Perlite Corp., Buffalo, N. Y.
 Fred L. Shea, Jr., Great Lakes Carbon Corp., Morton Grove, Ill.
 C. V. Sidwell, Wellite Corp., Tulsa, Okla.
 Don F. Snyder, Johnston Mfg. Co., Minneapolis, Minn.
 C. L. Stauffer, Vitrophyre Mineral Corp., Chicago, Ill.
 Glenn Stecker, Great Lakes Carbon Corp., Morton Grove, Ill.
 H. A. Stein, The Perlite Corp., Tempe, Ariz.
 James L. Wells, Perlite Mfg. Co., Pittsburgh, Penn.
 W. L. Weissman, Ozark-Mahoning Co., Tulsa, Okla.
 Doug Williams, Katterjohn Concrete Products, Owensboro, Ky.
 Buster Williams, Perlite Industries of Arizona, Phoenix, Ariz.
 John A. Wood, Perlite Products Inc., Albuquerque, N. M.



... Hewitt-Robins Vibrating Screens Process Them All!

Take a look at that big brute of a machine. It's a vibrating screen—a Hewitt-Robins Heavy Duty Scalper.

The big rock you see on its deck is a 3 x 2 x 1½ lump of ore weighing about 1100 pounds. The Scalper handles loads like this at 1000 tons an hour. Yet, it absorbs those loads—and its own vibration—so completely that a coin placed on edge on the base beams will stand up without toppling over while the machine is running!

The same company that makes this big brute also makes a small screen called a Ceramic Slip Lawn. This lawn is so precise in action, so effective in operation, that it finds and removes tiny specks of impurities—about ½ pound in every ton of material—from clay slip for pottery plants.

Think of that range—from 1100 lb. rocks to tiny specks! It's the best proof of all that Hewitt-Robins can satisfy

your vibrating screen demands!

Just look at these facts: Hewitt-Robins originated the circle-throw principle for vibrating screens. Hewitt-Robins created the elliptical throw. Hewitt-Robins pioneered in both 4-bearing and 2-bearing vibrators. Hewitt-Robins introduced the full-floating principle of vibration-absorption.

Whatever you want in vibrating screen equipment, you can safely rely on Hewitt-Robins. Tell us your needs; we will supply the answer. Write to Robins Conveyors Division, 270 Passaic Avenue, Passaic, N. J.

HEWITT-ROBINS VIBRATING SCREENS

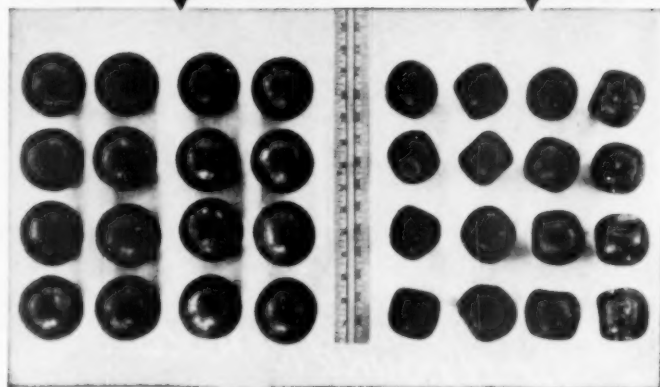
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BELT CONVEYORS (belting and machinery) • BELT AND BUCKET ELEVATORS
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 RUBBERLOK ROTARY WIRE BRUSHES • SCREEN CLOTH • SKIP HOISTS • STACKERS
 TRANSMISSION BELTING • VIBRATING CONVEYORS, FEEDERS AND SCREENS

SHEFFIELD
MOLY-COP
COPPER MOLYBDENUM ALLOY

VS.

COMPETITIVE
FORGED BALLS



THERE IS A DIFFERENCE IN FORGED STEEL BALLS

Again, the longer wearing qualities of Sheffield Moly-Cop balls have been demonstrated. This time in a test grinding barite ore at Magnet Cove Barium Corp., Malvern, Ark.

An equal number of Moly-Cop and competitive forged steel balls were charged into the same mill at the same time and were recovered after 4604 operating hours. All were originally $3\frac{1}{2}$ inch nominal diameter and marked for identification.



The recovered test balls are shown in the top photograph. Clearly evident is the difference in rate of wear. The competitive forged balls wore 38% faster, based on average diameter loss. Note also the pronounced difference in retention of spherical shape.

Typical fractures of the two types of test balls are shown in the lower photograph. Note the fine, hard, martensitic grain structure of the Moly-Cop ball.

The economy of Moly-Cop balls has been borne out in reports from all over the world. A comparative test in your own mills will demonstrate just how much more economical are Moly-Cop balls in your grinding operations.

Carbon and Alloy Steel
Ingots, Blooms, Billets, Plates,
Sheets, Hot Rolled Bars,
Steel Joists, Structural Shapes,
Reinforcing Bars,
Welded Wire Mesh,
Wire Products, Wire Rods,
Fence, Spring Wire,
Nails, Rivets,
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MIDDLETOWN, OHIO

Hot Combustion Air

(Continued from page 8.2)

ent. It loses its heat so slowly that a long time is necessary for cooling. For this reason, metallic parts are less harmed by lime if there is a flow of air. Lime is not abrasive.

Accordingly the cooler for lime must have two or three times the volume required for clinker. But the equipment need not be so heavy or heat resistant as is the case with clinker. It is hoped that more engineers will give their attention to the peculiar problem of cooling lime regeneratively.

The final value of any cooler is how hot is the total air of combustion. Cooling the lime to 300 deg. F. or less is very fine, but the cooler may dissipate much of the heat by radiation or even vent considerable warm air to the atmosphere as is done by cross air flow coolers, largely used in the cement industry to effect final cooling of the clinker. A thermometer or thermocouple may be placed in the hood. But in order to register only the temperature of the air and not receive radiant heat from the kiln, it must have a radiation shield. It is a job requiring an expert in such matters.

Even then the record is not correct due to the influx of the fuel blast at a lower temperature and of tramp air in leakage. This secondary air might be at 600 deg. F., but if the fuel blast and tramp air is at 150 deg. F. and constitute one-third of the total, the average of all the air and fuel is only 450 deg. F. High primary air percentage and carelessness in letting tramp air in will raise the apparent temperature of the secondary air but lower the temperature of the total air.

In spite of all this, the thermometer in the secondary air of the hood, properly installed and shielded against radiation, is the best indicator we have, and is fairly reliable if primary air and tramp air are kept small and constant.

Theoretically, it does no harm to have moderately high primary and tramp air. The heated air, being less in quantity, is that much hotter, and the final total air averages out the same. But there is a practical loss. With less air through the cooler, the lime is hotter. The cooler itself runs hotter and suffers more radiation loss. Finally, the higher temperature in the hood deceives the management that the practice is better than is actually the case.

The improved efficiency resulting from the use of hot combustion air appears as a lower temperature and lower quantity of stack gases at the other end of the kiln. If the kiln is provided with a preheater, further economies result. It is interesting to note that economies in a rotary kiln multiply, not add. Two 10 percent gains result in 21 percent gain. Three 10 percent gains give 33 percent.

Hence it is a problem of saving a

little here and a little there, perhaps any one apparently insignificant in itself. Cool the lime thoroughly by a cooler of proper design and properly operated. Conserve all the heat and get it back into the kiln. Insulate all points in the hot end where it can be done without harm to metal or refractory. Any radiated heat that is unpleasant to the kiln operator is a costly heat loss to the owner.

It must be acknowledged that the problem is not completely and satisfactorily solved. In this article, an effort has been made to present the problem and point the direction along which improvement can be made. The importance of the economic aspects must be impressed on the management. The designing engineer must recognize the breadth of the problem and design to meet the requirements. And finally, the operating man must realize the great economy that can be effected, and work to the proper operation and maintenance of the equipment, and not disregard the fine points of heat conservation as being too much trouble.

Draining Water from Sand

(Continued from page 71)

cement-coated Δ x $\frac{1}{2}$ in. material was then tamped sufficiently into block forms to produce good particle contact. Joints between blocks were filled with neat cement paste only moist enough to pour slowly and not spread into the porous slabs.

Could a more complete sand bunker or storage pile drainage be obtained by the use of porous slabs similar to those used in water filtration? Silt, clay, or particles might in time tend to clog the slab, making a backwash arrangement desirable (unnecessary in well washed specification sand).

The drawings on page 71 are submitted for consideration as a possible aid in sand dewatering. Porous concrete pipe, perforated metal pipe, and porous or perforated half-pipe arches may offer other possibilities for dewatering bunkers as well as for use in storage pile areas.

Buys Limestone Plant

NEW YORK COAL SALES CO., Columbus, Ohio, has acquired the Scott Limestone Quarries, near Hillsboro, Ohio. The company will produce highway stone, agricultural limestone and limestone for the steel and chemical industries. Other equipment installations planned include a ready-mixed concrete plant and an asphalt mixing plant.

Dredging Operations

C. J. BARKER, Pontiac, Ill., has started dredging operations on the Mississippi river between the Santa Fe bridge at Fort Madison, Iowa, and Lock 17, New Boston, Ill.

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STULZ-SICKLES CO.

SOLE PRODUCERS

91 N. J. Railroad Ave., Newark, N. J.

Producing Gravel

(Continued from page 59)

is done. The last mentioned belt is driven by a 25-hp. U. S. Electrical Motors induction motor.

Secondary Crushing

The two secondary crushers are mounted side by side. The 4 1/4-ft. cone gets its feed from the oversize from the scalper-grizzly and/or the preliminary screen. The 4-ft. short head gets its feed from the oversize resulting from the final crushed gravel screening section, to be mentioned later. The crushed product from both cones falls to an inclined belt that delivers to a 4- x 10-ft. "reject" screen. This is a dry two-deck unit. The oversize from this screen falls to the 36-in. belt that off-loads from the primary crusher. The throughs pass to an inclined belt serving two 4- x 14-ft. two-deck, dry, Symons screens mounted over the bins and which prepare the final sizes of crushed gravel. These two screens and the reject screens are the ones enclosed in the dustproof housings.

Thus it will be seen there are four vibrating screens on the top deck of the new plant, two for dry crushed rock and two for the gravel. The sand is taken wet through the lower decks of these two latter screens. Midway between these two screens is a glass-enclosed room in which are mounted the push button controls for the plant. The operator stationed here has an excellent view of all the pieces of equipment from the primary crusher to final screens, and from this station he can start or stop any piece of plant equipment. Another attendant is stationed in the lower part of the secondary crushing and preliminary screening section. At practically all times this man is in full view of the operator above, so that plant cooperation is easily achieved. A fourth attendant looks after the loading of trucks from the 16 bins. Horizontal slide gates are used under the bins.

Electrical Equipment

In a small structure near the main plant and on the ground floor is a neat and well designed control panel for the entire plant. It was supplied by the Trumbull Electric Mfg. Co., and features a Type "L" panel. The push button control panel in the glass enclosed structure on top of the bins was supplied by the Mullenbach Electrical Mfg. Co. of Los Angeles, Calif. The Symons vibrating screens on top of the bins are all driven by 10-hp. Sterling motors. Water for the new plant is supplied by a Fairbanks-Morse 8-in. Pomona deep well pump that is located in a structure near the office.

Carder Livingston is president of the company and Jim Worthington is superintendent. Other personnel include Harry C. Williams, sales manager, Ralph R. Wise, transportation manager, E. R. Cox, superintendent of equipment, and Ed Misenhimer, engineer.

Metal Mining Convention

(Continued from page 84)

direct wages and benefits. This means that in such a case management must use the figure of \$14.81 per shift in computing the cost per man shift incident to labor.

Since a union is important to its members only so long as it can expand the economic advantages, the author feels that it is reasonable to expect further expansion of contractual and legislative provision. This, of course, will mean added labor, administrative and governmental costs in the future.

Oil Shale Powers Train

Outstanding entertainment features included a Galena Days Celebration at Bingham Canyon, a Mining Jam-boree at Lagoon Park, and the Annual Banquet on the last day. Field trips were made to the Geneva Steel Plant and to the U. S. Bureau of Mines Oil Shale Project at Rifle, Colo. The Rio Grande Prospector which took conventioners to Rifle was the first in history to be powered by diesel fuel refined from oil shale. The 3750 gallons of fuel were recovered from 624 tons of shale. The same 624 tons also yielded 3750 gallons of gasoline, 6500 gallons of heavy fuel oil, seven tons of coke and miscellaneous by-products.

The next convention of the American Mining Congress, western metal mining convention, will be held in Los Angeles, Calif., October 22-24, 1951.

N.S.G.A. and N.R.M.C.A. Convention

(Continued from page 88)

portance to them of the goodwill of the ready-mixed concrete industry. Some localities have been so short of cement that ready-mixed concrete operators have been limited to 3-day work weeks. The operators recognize that there have been general shortages of cement, but believe that other users of cement, construction contractors for example, have been favored at the expense of the ready-mixed concrete industry. The association's "cement procurement" committee reported through its chairman, Robert C. Collins, that recent surveys indicated an increased capacity of the cement industry in 1951 of about 4,500,000 barrels.

Operators in seaport cities in Florida and on the West Coast reported that foreign cement was being brought in, but thus far deliveries were too irregular for that source of supply to be depended upon. Then, there is also the quality or the ability of some imported cement to meet American standards. On the subject of quality, some ready-mixed concrete operators privately expressed dissatisfaction with the quality of cement being supplied them by domestic manufacturers. Chiefly, apparently, the complaint concerns the uniformity of quality from shipment to shipment. Although not brought out in any general discus-

sion, it would appear that this lack of uniformity may be caused by the necessity of shipping the output of the mills direct to consumers, without the usual blending that the cement would get if it had first been through full silos.

Registration and Entertainment

The registration of the directors and their guests is given elsewhere in the report of the meeting of the directors of the National Sand and Gravel Association, since the meetings overlapped, and the meetings of both boards were attended by members of either board, if they so chose. The entertainment features of the program, which were enjoyed together by members and guests of both boards, are also described in the report of the meeting of the National Sand and Gravel Association's Board.

Magnesia and Hydrate from Brucitic Limestone

OCCURRENCES OF BRUCITE were discovered in Wakefield, Quebec, on a small area, and a plant started operating in 1942. The brucitic limestone, which varies in color from white to dark gray, alternates in places with bands of serpentine waste.

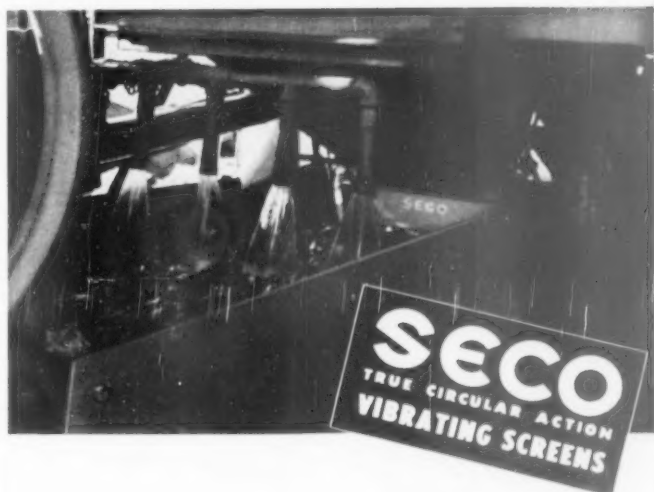
The rock is sorted, crushed and screened into five products. The fines are sold as agricultural limestone. Each size of rock is calcined separately in sequence in oil-burning rotary kilns. To effect recovery of magnesia and hydration and removal of lime, the calcine passes to a rotary cooler and to a Kritzer No. 10 continuous "dry hydrator" where the quicklime is slaked. The hydrator discharge, after passing through a scalping screen for the removal of oversize waste, is treated in two air separators which extract all the free hydrated lime in two grades which are carried to storage bins. The material which remains is mainly dehydrated brucite from which the final removal of traces of hydrated lime is effected in a wet hydrator and classifiers. After screening the fines go to form "MgO 70," used in fertilizers for soils deficient in magnesium, "MgO 90," the principal product of the plant, contains about 90 percent magnesium. Its actual or potential applications include production of magnesium metal, chrome-magnesia refractories, fused magnesium oxide, basic magnesium carbonate, magnesium bisulfite liquor used in the pulp and paper industry, magnesium oxychloride and oxysulfate flooring and as the raw material in the production of refined magnesia chemicals for pharmaceutical, rubber, glass, paint, cosmetic and other trades.

Gravel Company Sold

JOHNSON SAND & GRAVEL CO., DEER Larned, Kan., has been sold to Willis Eakin, who also operates a sand and gravel business at Dodge City.



No Lazy Spots . . .



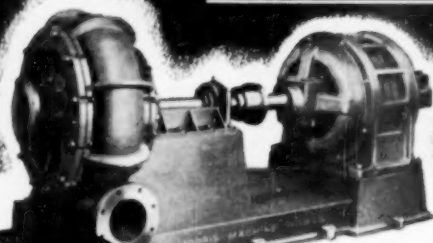
Here's the kind of efficient screening of materials that Seco Vibrating Screens are performing day after day, year after year. Seco's patented construction puts every inch of screen to work . . . there are no "lazy spots" to rob you of tonnages and profits. Get the whole Seco story. Send for Catalog No. 203, Dept. M.

Made only by Screen Equipment Co., Buffalo, N. Y.
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CENTRIFUGAL PUMPS

STATEMENT OF THE OWNERSHIP, MANAGEMENT AND CIRCULATION, REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, AND JULY 2, 1946 (TITLE 39, UNITED STATES CODE, SECTION 233) OF ROCK PRODUCTS, published monthly at Chicago, Ill., for October 1, 1950.

1. The names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher: Maclean-Hunter Publishing Corp., 309 W. Jackson Blvd., Chicago 6, Ill.

Editor: Brody Nordberg, 309 W. Jackson Blvd., Chicago 6, Ill.

Managing Editor: None.

Business Manager: E. R. Gaudley, 309 W. Jackson Blvd., Chicago 6, Ill.

2. The owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.)

Maclean-Hunter Publishing Corporation, 309 W. Jackson Blvd., Chicago 6, Ill. The stockholders of the Maclean-Hunter Publishing Corporation are E. R. Gaudley, 5240 Sheridan Road, Chicago 49, Ill.; J. L. Frasier, 2043 Irvington Ave., Evanston, Ill.; Estate of Col. J. R. Maclean, 7 Austin Terrace, Toronto, Ont., Canada; Horace T. Hunter, 129 Inglewood Drive, Toronto, Ont., Canada. The Maclean-Hunter Publishing Co., Ltd., 451 University Ave., Toronto, Ont., Canada.

3. The known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.)

None.

4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.

5. The average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the twelve months preceding the date shown above was (This information is required from daily publications only.)

E. R. Gaudley, Business Manager

Sworn to and subscribed before me this 5th day of Oct., 1950.

(SEAL)

M. E. Johnston
(My term expires October 22, 1953.)

Seek Dredging Permits

ERIE SAND & GRAVEL CO., Erie, Penn., has applied to the U. S. Corps of Engineers for a permit to dredge sand and gravel for commercial purposes in Lake Erie, off Fairport Harbor, Ohio.

SCHWARTZ SAND AND GRAVEL CO., Cleveland, has applied for a permit to dredge sand and gravel for commercial purposes in Lake Erie, off the Peninsula.

Cement Distributing Plant

SUPERIOR PORTLAND CEMENT CO.'s new storage and distributing plant at Seward, Alaska, has begun operations. The first shipment, 16,000 bbl. of bulk cement, was delivered to Fort Richardson via the Alaska Railroad.

Year-around unloading direct from ship's holds, by cement pump into storage or railroad cars, is made possible by an 800-ft. spur track to a deep-water dock.

Dredging Suit

OHIO RIVER SAND & GRAVEL CORP., Charleston, W. Va., was convicted in a recent suit for taking sand from islands belonging to H. A. Carpenter. In making the decision the State Supreme Court reiterated an old rule that the Ohio River's low water mark "is the point to which the water recedes at its lowest stage." Mr. Carpenter charged the company with dredging sand and gravel which he said he owned. The Supreme Court sent the case back to the Circuit Court with directions to prevent the company from taking more sand and gravel from the disputed area and to fix damages for the amount already taken.

Wire Rope Standards

THE NATIONAL BUREAU OF STANDARDS has announced that a revision of Simplified Practice Recommendation 198-43, Wire Rope, has been approved for promulgation.

Effective June 15, 1950, and identified as "R198-50, the recommendation in printed form is on sale by the Superintendent of Documents for 10c.

The revised recommendation, which adds a new table and effects a further reduction in variety of stock items, includes sizes, construction grades, and breaking strengths of the vast majority of tonnage of wire rope.

Cement Production

CEMENT PRODUCERS' EARNINGS for the second quarter are expected to show substantial gains compared with the first quarter of this year and with the first quarter of last year, *Journal of Commerce* reports. Cement output is expected to equal or exceed last year's output of 206,170,000 bbl., and some executives feel that the total this year may go as high as 211,170,000 bbl., in view of gains of about 8 percent in shipments for the first two months of the year.

With consumer income running high, miscellaneous uses as well as home building and public works uses of cement are showing sharp gains. Farm consumption is particularly large. Thus far, demand and supply are in balance, but a few spot shortages are possible later in the year.

Safety Bulletin

"SAFETY IN THE MINING INDUSTRY," a report issued in limited edition in mimeographed form by the Bureau of Mines, U. S. Department of the Interior, has been printed as a bulletin. The publication is said to be a valuable reference work not only on safety progress in the mining industry during the period 1906-47, but also on the principal causes of mine accidents and ways of preventing them.

The report is now on sale, for 40 cents, by the Superintendent of Documents, U. S. Government Printing Office.

Lifting Bars wedge between Lorain Liner Plates and clamp them down. Symmetrical Lorain Liner Plates can be reversed and interchanged to compensate for severe wear.



LORAIN ROLLED PLATE LININGS

cut grinding costs because -



This photo illustrates how thin a Lorain Liner Plate will wear without failing. Cut grinding costs in your mill by installing durable Lorain Liner Plates.

they go in faster . . .

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they increase mill output

To make better, more
economical grinding doubly sure
use U-S-S GRINDING BALLS

U-S-S Grinding Balls are especially made for the industry to the most exacting specifications of hardness and toughness. Standard sizes available from 1/4" to 5".



BECAUSE U-S-S Lorain Rolled Plate Linings are made to accurate size and in easy-to-handle sections, they save hours of installation time and greatly reduce mill down-time. And because of the toughness of the rolled steel from which they're made, linings can be kept in service until extremely thin—thereby increasing the usable diameter of the mill and boosting output.

In some applications, as lift bars wear down in service, Lorain Rolled Plate Liners may be reshored to full grinding efficiency—at only partial lining cost—by renewing the lift bars. Since the liner plates are symmetrical and interchangeable, they may be reversed to opposite ends of mill to balance wear when pronounced variance in wear occurs at feed and discharge ends. Such flexibility and ease in restoring lining efficiency mean reduced grinding costs.

U-S-S Lorain Rolled Plate Linings are available through leading mill manufacturers whose names will be furnished upon request.

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**LORAIN ROLLED PLATE LININGS
AND U-S-S GRINDING BALLS**

UNITED STATES STEEL

GENERAL

**Model 420 takes the lead
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General's Model 420 is a real performance leader whether used as Shovel, Dragline, Clamshell, Lifting Crane, Hoe, Piledriver, or Magnet Crane. Hoisting, swinging, steering, swing brake, crowd and retract, and dipper trip are all air controlled for instant, accurate, velvet-smooth response. Patented Air Cushion Clutches, on swing reversing shaft and countershaft, eliminate jerking, grabbing, and time-consuming adjustments.

Rugged outside dipper handles give dipper better support for crowding, put less strain on shipper shaft, permit use of box-type boom which can better resist torsion. Independent Boomhoist and Independent Travel are standard. Choice of Diesel or gasoline power. When you invest, get the best—GENERAL.

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The new WILFLEY MODEL K Centrifugal Sand Pump embodies important mechanical improvements especially adapted to the handling of cement slurry and results in stepped-up production and substantial power savings. Individual engineering. Write for details.

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Cement Production in Colombia and Argentina

A SHORTAGE of cement has grown increasingly severe in the Department of Antioquia, Colombia, so that all stocks were "frozen" by the department government in order to curtail exports. There are two cement mills in the Department of Antioquia whose combined production is estimated at 360 t.p.d. A quota system has been installed so that small contractors and works in progress may be assured of their fair share of the limited supply.

Production of cement in Argentina for the first nine months of 1948 totaled 17,529,760 bags (of 110 lb.). Deliveries were slightly higher, but both production and deliveries fell well below those for a comparable period in 1947.

New Safetygraph

NATIONAL SAFETY COUNCIL, Chicago, Ill., has prepared a new safetygraph showing why falls are one of the most serious of all industrial accident hazards, how they occur and how to prevent them. The council points out that one out of every four accidental deaths is caused by falls.

The safetygraph consists of 12 spiral-bound pages inserted in a portfolio. When set on a flat surface it opens to form an easel. On the front page are cartoons and photographs and on the back, in large easy-to-read type, is a safety talk for the instructor to give.

Perlite Literature

GREAT LAKES CEMENT CORP.'s Building Products Division, New York, N. Y., has announced the publication of two 4-page folders on fireproofing with lightweight Perlite plaster. One folder is on the fireproofing of steel columns and gives necessary specifications for 1-, 2-, 3- or 4-hr. ratings; the other folder is on a suspended ceiling under non-combustible construction which has a 4-hr. fire rating.

Cement in Ecuador

ECUADOR'S only cement plant is the American owned La Cemento Nacional. Its total production of portland cement for 1949 was 1,229,406 sacks (of 42.5 kilograms each), a 13 percent increase over the 949,854 sacks in 1948. Production is expected to increase to 1,600,000 sacks in 1950. The company plans to purchase and set up a new mill and it is anticipated that production for 1951 may reach 2,400,000 sacks and thus more than meet normal countrywide demand.

There have been efforts by groups of Ecuadorian businessmen and the former Development Institute of the Ecuadorian government to establish another cement plant but these attempts have been unsuccessful up to this time, *Mineral Trade Notes* reports.

Power Allocations

THE COLORADO RIVER COMMISSION for Nevada set June 1, 1951 as the effective date of new contracts with four leases at the state-owned Basic Magnesium holdings near Hoover Dam. Contracts have been concluded with U. S. Lime Products Co. and three other firms. All have received increased allocations of power in the amount of 355,000,000 kw.-hr.

Close Abandoned Mines

HIGHWAY SUPERINTENDENT Arthur J. Yaw, has informed the Board of Supervisors of New York that the State Bureau of Mines is requesting the county to close several abandoned gypsum mines in Akron Falls Park to prevent possible future fatalities. It is estimated \$5000 will be needed to close the shafts permanently.

Distribute Safety Bulletin

AGRICULTURAL LIMESTONE INSTITUTE has made available for member companies a copy of the National Safety Council's Industrial Data Sheet D-Gen. 13, describing the hazards to health and safety associated with the handling of solvents and caustics used for removing oil and grease from metal parts, and giving specific recommendations for removal of those hazards.

Plant Expansion

RIVERSIDE CEMENT CO., Los Angeles, Calif., has announced that the new \$1,000,000 raw grinding department at its Oro Grande, Calif. plant will soon be ready to start operations. The department will increase the plant's capacity to 3,250,000 bbl. of cement a year, an increase of about 100,000 bbl. per month.

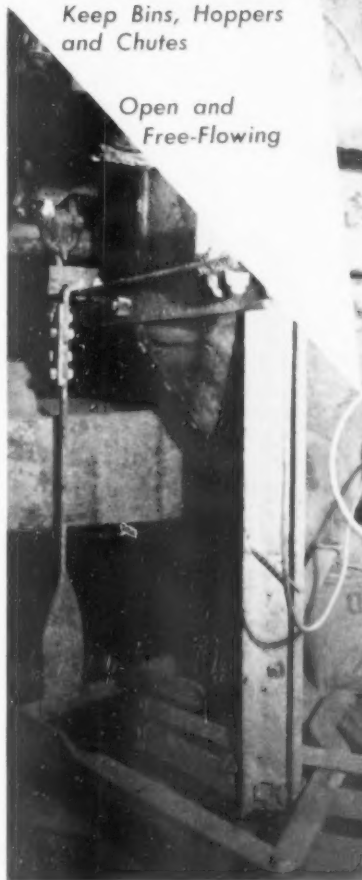
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"Pulsating Magnet"

ELECTRIC VIBRATORS

Keep Bins, Hoppers and Chutes

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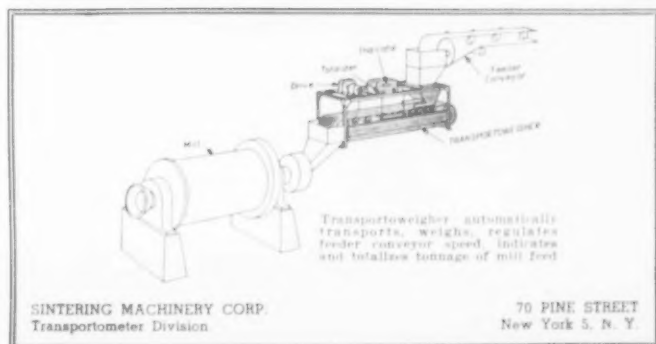
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per minute break down arching and plugging — eliminate pounding and poking.

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125 ft. of 100 lb. air
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or a heavy duty rock
drill at full pressure.

15% to 20% more air @ 100 lbs.
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It is important to you that, at full pressure, air tools hit enough harder and faster to do 30% to 40% more work than they do at the 70 lbs. pressure maintained by undersized compressors.

Jaeger "new standard" ratings (the first increase in the industry since 1932) give you the air you must have to run today's tools at proper pressure and efficiency—75 ft. of 100 lb. air instead of 60—125 ft. instead of 105—185 ft. instead of 160—250 ft. instead of 210—365 ft. instead of 315—600 ft. instead of 500. If this cost-saving interests you, send for Jaeger Catalog J. C.

600 ft. of 100 lb. air — Runs 2 big wagon drills at full pressure, drilling 30% to 40% more footage than you can get with any 500 ft. compressor.



See your Jaeger distributor or write

THE JAEGER MACHINE CO.

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**PUMPS • MIXERS • HOISTS • TOWERS
TRUCK MIXERS • PAVING MACHINERY**

Cement Production Overseas

THE CEMENT PLANT in Peremend, Hungary, completely destroyed during World War II, has been rebuilt and began production the end of December, 1949, *Mineral Trade Notes* reports. It was predicted that in 1950 India would be producing 3,500,000 tons of cement as against the present consumption of 4,000,000 tons, which will advance by 2,000,000 tons within the next few years. The present installed capacity is 2,700,000 tons in 21 units. In Spain, total output including natural cement was 2,330,850 metric tons in 1948, compared with 2,186,334 tons in 1947, and 2,145,140 tons in 1946, according to *Estadística Minera y Metalúrgica de España*, for 1948.

Ship Gypsum

ANDERSON-DUNHAM Co., Baton Rouge, La., has begun shipments of gypsum for cement retarder from the Winnfield quarry. The company is expected to ship about 10 carloads a day to cement mills in New Orleans, Mobile, Memphis and Birmingham. Ted Dunham is manager of the operation.

Install Dust Collectors

LAWRENCE PORTLAND CEMENT Co., New York, N. Y., has spent \$175,000 for installation of dust collectors at its plant at Rockland, Me. According to the company the equipment is designed to operate at 85 percent efficiency.

Pension Plan

EARL GARBER, president, Northwest Magnesite Co., has provided a pension plan for his employees, similar to pension plans of the large steel companies. It provides a guarantee of \$100 per month for those working the required length of time, the company paying the difference between what the worker receives in social security benefits.

Liming Commercials

AGRICULTURAL LIMESTONE INSTITUTE, Washington, D. C., is offering a series of suggested radio spot announcements at the request of members. The series consists of ten announcements which present facts on the importance of soil liming. Each is written in three lengths: 1 min., 30 sec., and 15 sec.

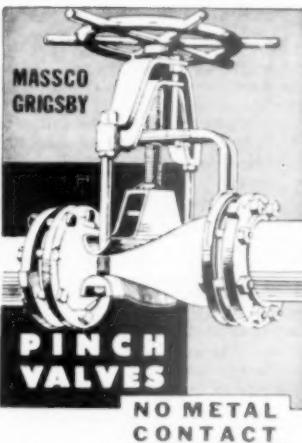
Gravel Plant Opens

NORFOLK GRAVEL Co. has started operations in a pit near Norfolk, Neb. E. W. Anderson is the owner.

New FARREL-BACON CRUSHER has many advantages

Design features of this 36 x 30 E stone crusher include: (1) Mechanic frame, sectionalized when necessary; (2) removable water cooled bearings; (3) improved design of swing jaw bearing; (4) force-feed oil lubrication, or circulating system if desired; (5) split flywheels; (6) flat or V-belt drive.

Write for further details or engineering help. **BA-1**



Recommended for transporting abrasive and/or corrosive slurries and liquids, where severe wear makes replacement of metal valves too costly. Rubber or synthetic sleeve closes tight even on solid particles. No packing glands, not affected by freezing or scale formation. Sizes: 1", 2", 3", 4", 6", 8", 10" and 12" dia.

**MINE & SMELTER
SUPPLY COMPANY**

Denver Salt Lake City El Paso
1775 Broadway, New York

Marquette to Build Mississippi Cement Mill

MARQUETTE CEMENT MANUFACTURING Co., Chicago, Ill., has announced plans for the construction of a new cement plant at Brandon, Miss. It will be located on a 500-acre tract of land at the intersection of U. S. Highway 80 and tracks of the Illinois Central Railroad. The plant, which is expected to be completed by September, 1951, will produce 1,000,000 bbl. of all types of portland cement annually as well as oil well and masonry cement, according to company officials.

The Marquette company also plans to build a dock at Vicksburg, Miss., with facilities for transfer of cement from railroad cars to barges on the Mississippi River. A branch office of the Marquette sales department will be established in Jackson about July 1 of next year. Marquette also operates producing plants at Oglesby, Ill.; Cape Girardeau, Mo.; Des Moines, Iowa; Nashville and Cowan, Tenn. Retail plants are located in St. Louis, Mo. and Memphis, Tenn. The company states that when the Brandon plant is in operation, total producing capacity of the company will exceed 10,000,000 bbl. of cement annually.

Crushing Operation

ANDERSON-ONDALE ROCK PRODUCTS Co., Holton, Kan., has set up a portable crushing plant at Herington. The unit previously had been located in Jackson and Nemaha counties.

Plans Gravel Plant

W. D. HADEN Co., Houston, Tex., recently purchased a 106-acre industrial site for an estimated price of \$425,000. Reports indicate that the company plans to build a sand and gravel plant on part of the site and develop the rest as an industrial subdivision.

Begins Gypsum Shipments

COLUMBIA GYPSUM PRODUCTS, INC., Windermere, B. C., has sent the first shipment of gypsum rock to the calcining plant at Spokane, Wash., where it will be converted into soil conditioner and building products.

Opens Asphalt Plant

ALABAMA ASPHALT Co., Decatur, Ala., has started operations at its new asphalt road mix plant, with a capacity of about 80 t.p.h.

Resumes Shipments

THE ALMA STEAMSHIP Co., operating in the Caribbean, resumed shipments in August from Jacksonville, Fla. One of the first shipments was rock crushing machinery which had been dismantled and was enroute to Venezuela.

There's a Macwhyte Rope that's the right rope for your equipment

All job proved - - a thousand and one wire ropes to choose from

For easy handling and longer service use **PREformed Whyte Strand Wire Rope**—it's internally lubricated

Ask a Macwhyte representative to recommend the rope best suited for your equipment.

MACWHYTE COMPANY

2949 Fourteenth Avenue, Kenosha, Wis.

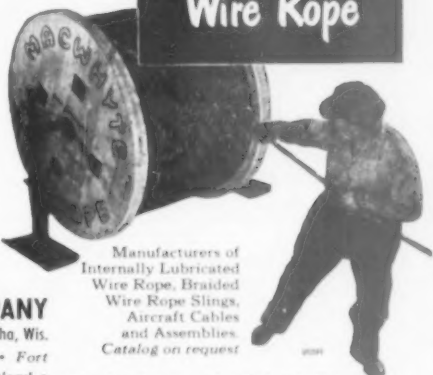
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DIGGING
with a



Sauerman Slackline Cableway

For 41 years the Sauerman Slackline Cableway has been the favored machine of the sand and gravel industry for wet pit excavation. It has no equal for low cost results in digging a large, deep pit and moving material in the same operation direct to top of plant or surge pile. The operator's job is easy and maintenance is simple. With occasional replacement of a few parts, a Sauerman machine will work at top capacity for many years and return its owner a big profit every year.

The gravel plant of Louis Marsack & Sons, Mt. Clemens, Mich., offers a typical example of how the long-lasting and economical Sauerman Slackline Cableway enables its owner to build up a profitable business on a modest investment. The Marsack firm has for years been one of the leading suppliers of sand and gravel to the Detroit market and all of its pit excavation has been handled by Sauerman cableways. Production last season was 70,000 cu. yd. The picture shows the present pit, 700 ft. wide by 60 ft. deep, and the new 1 cu. yd. Sauerman machine installed last year to replace a smaller Sauerman machine which had been in use since 1925.

Write for new Slackline Cableway catalog.

Rope Haulage Equipment Specialists Since 1909

SAUERMAN BROS., Inc.

530 S. Clinton Street

Chicago 7, Illinois

STEEL

Every Kind

Quick Delivery

Plates, Structural,

Bars, Sheets, Tubes, etc.

Carbon, Alloy, Stainless

Steels, Babbitt Metal.

RYERSON

Joseph T. Ryerson & Son, Inc. Plants: New York, Boston, Philadelphia, Detroit, Cincinnati, Cleveland, Pittsburgh, Buffalo, Chicago, Milwaukee, St. Louis, Los Angeles, San Francisco

Articles on Liming

AGRICULTURAL LIMESTONE INSTITUTE, in a letter to the industry, summarized a number of articles on liming which have appeared recently in various publications. These include:

"Lime is Needed to Maintain Fertility," by H. J. Snider, Agronomy Department, University of Illinois, February, 1949, "Better Crops with Plant Food." According to the author, the most productive soils in the State of Illinois are relatively high in available calcium and the less productive are relatively low in this element. He states that a large supply of available calcium in soils is usually accompanied by a higher total nitrogen and or-

fields. To read lime results compare 1 with 3 and 2 with 4.

"Liming Land," by P. E. Karraker, Professor of Soils, University of Kentucky, March, 1949, "Southern Agriculturist." The author sets forth the usual reasons for liming and other sound principles that apply to the practice, but strikes a note of warning by stating, "While generally in the South the amount of liming should be considerably increased, in all states of the South some land is being over-limed."

"Too Much Lime May be Harmful," by L. M. Turk, Professor of Soil Science, Michigan State College, December, 1948, "What's New in Crops &

Soil Productive Level	pH	Replaceable Calcium	Lb. per Acre Organic Matter	Corn bu./A	Hay lb./A
1. High	5.5	7,700	No Lime	61	3,000
2. Low	4.7	730	96,000	11	500
			31,000		
3. High	6.4	10,000	Limed	73	5,200
4. Low	6.5	3,000	106,000	30	3,200
			33,000		

ganic matter content. An abundance of organic matter means good tilth and high water-holding capacity. He illustrates his contention in the following table comparing soils of a high-productive level with those of a low-productive level. Each value in the table is an average of five experiment

Soils." The author starts his article with the question, "Can I apply too much lime?" He states that the right answer in most cases is "Don't worry about it" because few acid soils have been limed to excess. Many have received no lime and others could use more. There are very few soil-improving practices, if any, that will give greater returns than the adequate liming of acid soils, the author states.

"How Lime Applied in '46 Paid Off in '48," by M. T. Vittum, April, 1949, "Farm Research," published by New York Agricultural Experiment Station, Geneva, N. Y. The author reports on an experiment conducted to determine the effect of fertilizer and lime treatments on the growth of canary peas. The treatments were applied in the spring of 1946. After the peas were harvested the plots were sown to wheat and seeded to a clover-timothy-redtop mixture. Hay was harvested in June 1948. The results were that, while the limestone did not increase the yield of peas, two years later it had a pronounced effect on the yield and composition of hay.

Buys Gypsum Operation

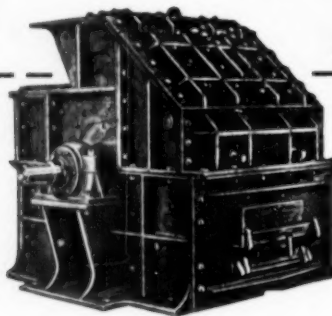
CELOTEX CORP., Chicago, Ill., has acquired the properties of Wasem Plaster Co., Fort Dodge, Iowa. These properties consist of a plaster plant and extensive gypsum deposits in that city. Plant rehabilitation and further expansion of production facilities are planned.

Stone Plant Sold

CLARK COUNTY LIMESTONE AND ROCK CO., Kahoka, Mo., has been sold to the Brooks Construction Co. New equipment has been purchased to increase operational efficiency of the quarry. The plant will be known as the Brooks Quarry.

HIGH EFFICIENCY REDUCTION for Your CRUSHING NEEDS

with
AMERICANS



From roadstone to agstone sizing. Americans offer the flexibility and rigid control of sizing — to make each specific reduction job more efficient — and more profitable!

For better agstone sizing, American A.S. Hammermills are designed with a special center feed — to lengthen the travel of stone and give a higher ratio of fines. With the conventional front feed, minimum fines are assured. Easy external adjustments give the individual size control and flexibility to meet your changing market needs.

Three different hammer types are furnished to give the exact reduction you require. A. "Brute," for heavy. B. "Broad-head," for medium. C. "Splitter," for fine.

A. BRUTE
for heavy



B. BROAD-
HEAD
for medium



C. SPLITTER
for fine



Write for your copy of "Better Stone Crushing."

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CONCRETE UNITS · READY-MIXED CONCRETE



Main office and batching plant of Central Pre-Mix Concrete Co., Spokane, Wash.

U. S. Army Post Office, Long Island City, N. Y. Built under supervision of Col. Edgar W. Garbisch, U.S.A., Dist. Engr. Architect—Engineers—Alfred Hopkins and Associates—Contractors—John A. Johnson Contracting Corp., Brooklyn, N. Y. Concrete Block by National Brick Corp., L. I. City, N. Y.



Feeds easily through machine

Duraplastic portland cement's air-entraining feature permits use of a damper mix for machine-made products. This damper mix is "rubbery" and cohesive. It stays together better and feeds easily through machines. Manufacturers find Duraplastic ideal for concrete block, brick, drain tile, silo staves and many other machine-made products.

Makes superior concrete products

Plants using Duraplastic report increased resistance to passage of water in finished products. Costly breakage is reduced because green products made with Duraplastic can take rougher handling and there are fewer curbs and throwbacks. Face texture is richer, especially when harsh aggregates are used. Edges and corners are truer.

YET DURAPLASTIC® COSTS NO MORE

It sells at the same price as regular cement and requires no unusual changes in procedure. Complies with ASTM and Federal Specifications. For descriptive booklet, write Universal Atlas Cement Company (United States Steel Corporation Subsidiary), 100 Park Avenue, New York 17, N. Y.

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"Duraplastic" is the registered trade mark of the air-entraining portland cement manufactured by Universal Atlas Cement Company.

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AIR-ENTRAINING PORTLAND CEMENT

Makes Superior Concrete Products at No Extra Cost



"THE THEATRE GUILD ON THE AIR"—Sponsored by U. S. Steel Subsidiaries—Nation's Evening—NBC—National

INDUSTRY NEWS

Doubles Output

CONCRETE PRODUCTS CO., Charlotte, N. C., has completed its expansion program and has doubled its production of precast reinforced concrete septic tanks. The plant is producing a complete "package unit" for installing a sewage system at a rural or suburban home. The package unit includes a one-piece, 1000-gal. tank of two compartments, sanitary tee, reinforced lid, 240 ft. of drainage tile and distribution box. A new tank was designed recently which meets the requirements set up by the state, county and city health departments. In addition to the tanks, the company makes precast concrete tank cradles for use in bottle gas installations, and also water meter boxes. The firm is under the management of E. R. Zimmerman, president and treasurer, and T. D. Price, vice-president and superintendent.

N.C.M.A. Promotional Program

NATIONAL CONCRETE MASONRY ASSOCIATION, Chicago, Ill., as part of its promotional program has announced its participation in the Producers' Council Technical Bulletins which are devoted to the use of building materials in specific types of structure. The first of these bulletins emphasizes residential construction; the second will have commercial building as its main theme. Each bulletin will be represented by N.C.M.A., with four pages showing the use of concrete masonry in that particular type of building.

Offbearing Carrier

M. L. LAFFERTY, Kentucky Concrete Pipe Co., Louisville, Ky., has designed and built an electric offbearing carrier

capable of handling pipe up to 60-in. diameter. By moving a stick forward the carrier moves up to the form. Then by pressing a button, arms lift the form off the machine. The stick is pulled back and the carrier moves off, carrying the newly made pipe and form.

First Annual "Eschenbrenner Awards"

UNIVERSAL CONCRETE PIPE CO., Columbus, Ohio, has announced its plans to sponsor the Eschenbrenner awards, three annual \$500 prizes for senior civil engineering students. The purpose of the awards is "to stimulate original thinking in the design, fabrication and use of concrete products."

The awards are open to all senior students of civil engineering in recognized institutions east of the Mississippi river, including the U. S. Military Academy, U. S. Naval Academy and the Coast Guard school. Rules for the program were drawn by deans of engineering at 20 colleges and universities, and the judging will be made by prominent consulting engineers, and will be based on (1) ingenuity and originality of the idea, (2) thoroughness of the research, design, description or procedure, (3) practicability of the result, and (4) technical competence of the presentation.

Papers must be submitted to the company by March 31, and announcement of the winners will be made by May 15. In addition to their \$500 checks, winners will receive engraved silver medallions. The awards are to be made as the result of "Hee" Eschenbrenner's genuine desire to stimulate new developments in the industry. Mr. Eschenbrenner is president of Universal Concrete Pipe Co.

HEALDSBURG CONCRETE PIPE CO., Healdsburg, Calif., was granted permission by the Sonoma County Planning Commission to move its plant location to a new site just south of Healdsburg.

TONY CALABRO & SON, Waterbury, Conn., sand and gravel firm, has applied for a permit to operate a ready-mixed concrete business in connection with its aggregate business, indicated by the paper slips pasted to

HOMERIDGE STEEL CO., Cuyahoga Falls, Ohio, has been organized to produce ready-to-install steel reinforced concrete steps. Robert Hamilton is president of the new firm.

RALPH J. WATSON has purchased the Colorado Concrete Manufacturing Co., Colorado Springs, Colo., in what is said to be a \$50,000 transaction. The company supplies concrete sewer and drainage pipe as well as pumice concrete block.

NORMAN BLOCK AND TILE CO., Deluth, Minn., has been opened by Conrad Norman, concrete contractor. The company will manufacture drain tile and a variety of sizes of gravel and cinder block.

CITY BLOCK AND SUPPLY CO. is being established at Chillicothe, Mo., for the production of 4-, 6- and 8-in. concrete block.

VERNON M. CAGLE, operator of Concrete Co., Carthage, Mo., has purchased a tract in North Carthage as a location for the firm's ready-mixed concrete plant.

SHERMAN CONCRETE PIPE CO., Johnson City, Tenn., has announced plans to double its size and production, in view of a new contract with the city of Bristol, Tenn., to provide 345,000 ft. of 8- to 42-in. pipe for a sewage disposal system.

LOCK JOINT PIPE CO., East Orange, N. J., has purchased the Illinois-Wisconsin Concrete Pipe Co. plant at Beloit, Wis., from J. D. Mollendorf.

STOUGHTON SAND AND GRAVEL CO., Stoughton, Mass., has expanded its business to include a ready-mixed concrete plant.

JOSE CONSTRUCTION CO. has opened a concrete block plant in Prescott, Ariz. When in full operation, the plant is expected to produce over 1000 block per day; these will consist of both heavy aggregate and cinder block, in sizes 8 x 8 x 16 and 8 x 4 x 16. Harlan Jose is in charge of operations.

CHARLES ROTH AND GLENN ANDERSON, Burlington, Kan., have purchased the concrete block equipment from an existing plant and expect to double output as soon as additional equipment can be added.

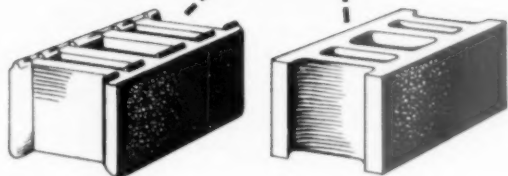


The National Concrete Masonry Association and the Portland Cement Association sponsored the concrete masonry television home show above at the 1950 Chicago Fair. The home was designed around the use of television, which could be viewed from four rooms. Extensive use was made of exposed concrete masonry units. The interior combined both plastered walls and concrete masonry in random ashlar patterns.

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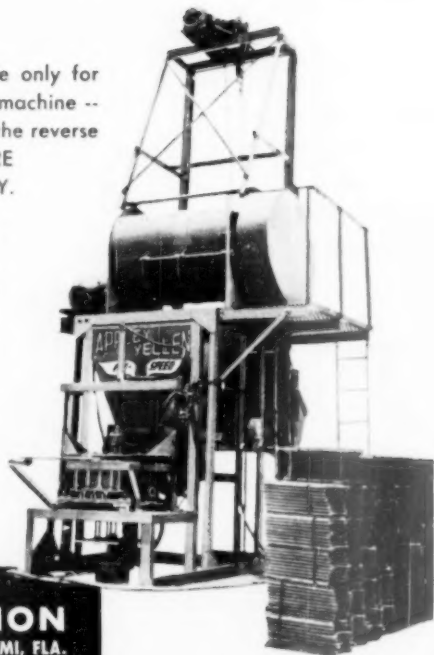
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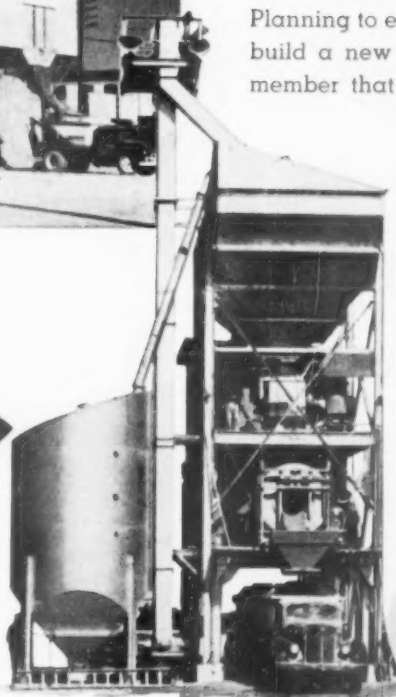
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Butler Engineered Design are noted for an ingenuity in plan, flow, and labor-saving, efficient operation that leads to production and profit levels above the expected. So, consult the Butler Engineer.

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There are a lot of stimulating ideas for the Ready Mixed operator in Butler Bulletin 185. Yours on request. Send for it — now.

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READY-MIX Comes to Chicago!

"King" Size 6 Yd. Smith Tilters and Smith-Mobile Truck Mixers and Agitators Lead the Parade

Ready Mixed Concrete is relatively new in Chicago. But as this big city turns from local job mixing to Ready Mixed Concrete, you find Smith Tilting Pre-Mixers and Smith-Mobile Truck Mixers and Agitators leading the parade as usual.

Smith equipment was NOT selected on the basis of price and delivery. Instead, operators chose it on the basis of quality and proven performance in Chicago, as well as all over the world. The biggest plants in Chicago are using

this winning combination . . . Smith Tilting Pre-Mixers and Smith-Mobile Truck Mixers and Agitators. So are many of the other operators in the greater Chicago area.

The fast growing demand for concrete in and around Chicago has created a PEAK requirement. Smith Tilters and Smith-Mobiles are filling the bill. They are doing a rugged job, with a minimum of lost time and maintenance cost. Get the complete story. Ask for bulletins Nos. 239A and 244.

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Material Service Corp. plant at 901 N. Sangamon Street, Chicago, Ill. Smith 6-yard Tilters and Smith Mobile 7½ and 8½ yard Agitators form a winning combination.



Consumers Company new plant at 5541 West Grand Ave., Chicago. Smith 6-yard Tilters and Smith Mobile 6½-yard Agitators. ONE BATCH PER TRUCK. No waiting.

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SMITH MIXERS

FOR BIG CONCRETE PROJECTS AND READY-MIX PLANTS

ACCURATE BATCHING OF CONCRETE

**Central Pre-Mix Concrete Co. has
system for accurately controlling
fractional batches of concrete**

By **WALTER B. LENHART**



General view of the Division St. plant

THE CENTRAL PRE-MIX CONCRETE CO., of Spokane, Wash., has two pre-mix batching plants that serve the Spokane area. The older plant located at N. 805 Division Street in downtown Spokane is the largest producer. The newer plant is at Yardley, a suburb near the east end of Spokane. At both Kennewick and Richland, Wash., a subsidiary ready-mixed concrete company is operated under the name of the Pre-Mix Concrete Inc. The two latter plants are serving the Hanford atomic energy area. The Richland plant is owned by the Curtis Sand and Gravel Co. but is operated by Central Pre-Mix. The company recently received the contract for ready-mixed concrete at the new AEC Reactor Station at Arco, Idaho.

Central Mixer

The Division Street plant in downtown Spokane first used a Rex 2-cu. yd. mixer that discharged directly into the trucks. At that time the plant had a capacity of about 75 cu. yd. per hour but this was too slow, so a 2-cu. yd. collecting hopper was installed in such a manner that the mixer could dump to it, and the collector hopper could in turn dump to the mobile equipment. This intermediate storage hopper increased the capacity of the plant to around 115 cu. yd. per hour, but this still was not enough to satisfy the company's needs.

The next move was to make time studies of all the detailed operations involved in preparing ready-mixed concrete. These studies revealed that it was taking 10 sec. too long for the portland cement to be transferred to the weighing equipment, so another screw conveyor was installed alongside of and parallel to the one previously used. As a result of this

change, the plant's capacity was increased to 140 cu. yd. per hour, its present capacity.

Mobile Radio Installations

Another innovation at this busy plant was the installation of mobile two-way radio equipment on some of the mixer trucks. So far the company has seven units installed in cars, pickups and mixer trucks. The operating heads of the company have them in their cars, as does the head of the maintenance department and the salesmen. So far two of the radios are on the mixer trucks, but the experiment is turning out so successfully that more mixer trucks may be equipped with them. The units are installed on a rental basis but any rentals paid will apply on the purchase price, which

is about \$500 per installation. A service charge of \$17 per month gives maintenance and 100 calls per unit. Central Pre-Mix Concrete Co. has its own trunk telephone line between the Division St. and Yardley plants. All dispatching is done from the main plant.

The advantages of the two-way radio mobile telephone for ready-mixed concrete producers are obvious, but to emphasize them we might mention that on a local air strip job the slump requirements were for 2.5 in. slump concrete and the contractor was being held to a strict reading of the specifications. Central Pre-Mix loaned the contractor one of its radio-equipped cars. As batches were being delivered the contractor could phone directly to the plant to change the water content of the concrete as needed. At this job there was no telephone available except one a 20 minute drive away. The newer type of mobile radio used by these operators is about the size of a conventional car heater. The unit is mounted under the dash near the steering column.

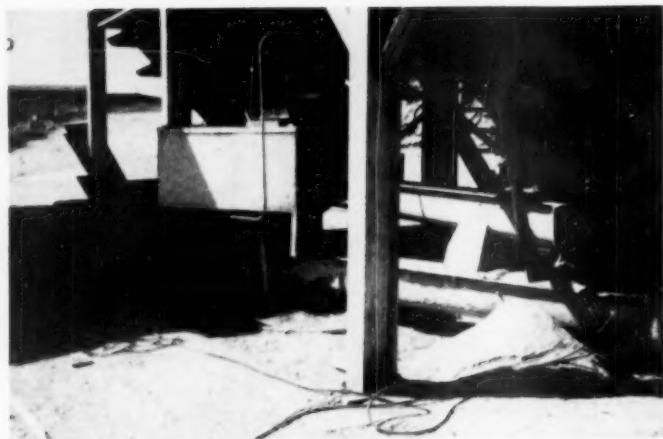
Testing Laboratory

The company has recently equipped a research and testing laboratory on one of the upper floors in the Division Street plant. A technician with previous training as a structural engineer has been placed in charge of this department. Test cylinders are cured by immersion in a water tank and broken on a 200,000-lb. capacity, hand operated, hydraulic, Timus-Olsen unit. Breaks are made on cylinders that range from 16 in. in age up to a year.

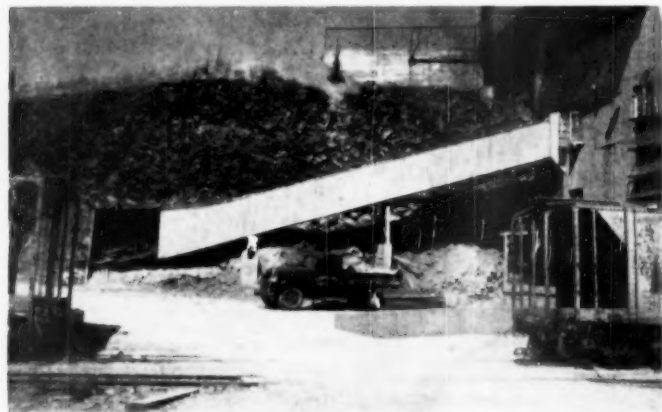
There is a decided sales advantage in having available this type of equipment: if a contractor is pouring a wall-form, a test cylinder made from



General view of the Yardley plant; top arrow points to the stub conveyor and bottom arrow to the collector bin following the 2-cu. yd. mixer



Arrangement of the screw conveyor from track hopper, showing where it slopes under the track, and the method of reclaiming cement from the lower storage silos



Reversible belt conveyor on flat carrier rolls is used to transfer special cements and barrels of air-entraining agent to and from the mixing floor level



Controls at the Division St. plant are pneumatic, designed by the company

the same concrete he used can be broken in, say 16 hr., and from this information the contractor can decide whether it is advisable or not to strip the forms.

The company has standardized on 4-cu. yd. mixers and has 21 Rex, two Jaegers and five Smith units.

Batch Weighing Methods

The Toledo dial scales have been provided with a company-made device that helps eliminate errors in preparing fractional batches of concrete. Small slips of paper each calibrated for 4-, 5- and in some cases 6-sack mixes have been pasted on the dial, starting near the "zero" weight markings. These slips of paper are placed at the proper point around the dial and are for $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{4}$, $1\frac{1}{2}$, $1\frac{3}{4}$, $1\frac{1}{2}$, 2, and $2\frac{1}{4}$ cu. yd. batches. The piece of paper for the smallest batch listed is naturally nearer the zero scale markings. In addition, in front of the dial has been placed a 3-pronged movable set of pointers. A small hand wheel and gear easily makes it possible for the operator to set these pointers at a given position.

At the time the picture shown was taken, the operator was preparing a batch of $1\frac{1}{4}$ cu. yd., so he set the right hand pointer at the proper point as indicated by the paper slips pasted to the dial for the $1\frac{1}{4}$ -cu. yd. mix. At this setting, the weight of coarse aggregate is from "zero" to where the first of the prongs points, in this case about 3900 lb. The distance between this prong and the middle one represents the weight of fine sand to use, and the balance of the distance to the third prong is for the coarse sand.

Thus, in operation, when the scale pointer gets under the first prong, the coarse aggregate gate can be closed, then the fine sand added until the scale needle reaches its pointer (the middle one) and the coarse sand added until the scale pointer reaches a point under the right hand prong. By setting this device—a simple turn of the knob—the chances of error in calculating the fractional yardage batches is reduced materially. The device was developed by one of the employees of the Central Pre-Mix Concrete Co.

Bin-Batching

The Division Street plant is so located that the six aggregate bins can be filled by trucks dumping direct to the bins. They have a total capacity of 200 cu. yd. Alongside the mixing plant is an older dry batcher with 300 cu. yd. additional bin storage for aggregates, which can be drawn on when necessary. Portland cement is received at the plant and unloaded to a track hopper. The screw conveyor offbearing from this small hopper slopes under the railroad track and forms an acute angle with the rails. The screw delivers to a bucket elevator that can fill the "day" tank or the steel rectangular storage bins near

ground levels. These bins are re-claimed to the same screw conveyor used for unloading cement. Plans are underway to have trucks deliver and dump cement in a manner similar to the aggregate set-up. This is intended as an emergency measure and probably would only be used should the bucket elevator or screw conveyors be down for any reason. To expedite unloading of the bulk cement, a portable heavy-duty electric vibrator is clamped onto one of the angle irons near the hopper of the car.

The weighing and batching equipment was designed and assembled by the company. Air-operated gates were welded to the steel bins. A Spangler automatic water valve is used on the water measuring meter.

Special bagged cements, barrels of Darex and similar additives are elevated to the mixing floor by an inclined belt conveyor that is provided with sloping sideboards. It is reversible, so heavy products can be sent either way. Flat carrier rolls are used on this conveyor. It is a 24-in. unit. Darex is used in all outside concrete.

The company's newer plant at Yardley features Johnson weigh batching equipment with a Fairbanks-Morse dial scale. The Rex 2-cu. yd. mixer first used in the Division Street plant was moved to this plant and a 2-cu. yd. Koehring installed at the home plant in its place.

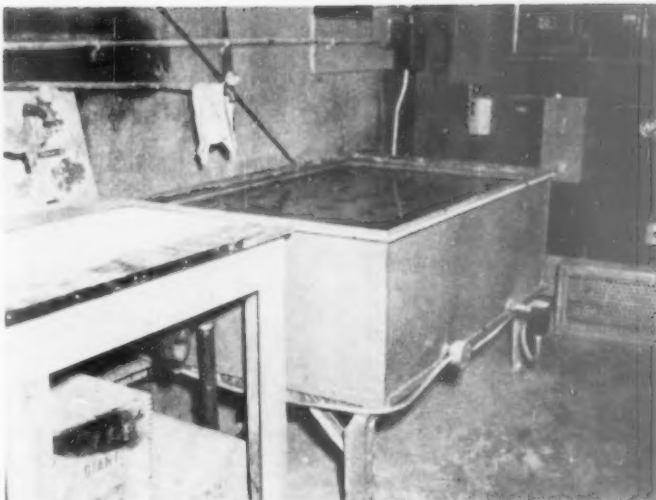
To get the mixer in place at Yardley, the bins and batching equipment all had to be raised about 11 ft. The company did not wish to raise the bucket elevator used for the aggregate; instead, a short stub conveyor was installed. The bucket elevator dumps to this conveyor which in turn serves the bins. Bulk cement is delivered to this plant over the Northern Pacific railroad. The Division Street plant is served by the Spokane International railroad.

Affiliated Plants

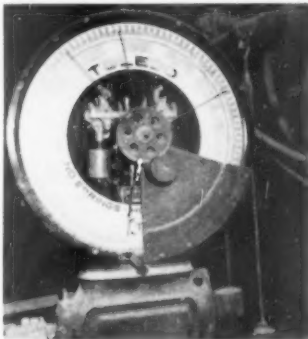
The company is affiliated with the Union Sand and Gravel Co., which has one plant at Yardley and one at the western edge of the city of Spokane. Both use Sauerman dragline equipment in the pits. At Yardley, ground-stored aggregates are loaded to trucks by a Wagner Duo-way Scoopmobile. It has three wheels. The novel feature of this unit is that the driver's cab is near the center of the unit and on one side. He faces the long axis of the loader. In that position he can drive or turn the unit very quickly and can load an 8-cu. yd. truck in 2½ min. It has loaded over 1000 cu. yd. in a day with many moves between different stockpiles.

The plant at Kennewick is a 154-Dual Noble plant with 1200-bbl. storage for cement and 200-cu. yd. aggregate storage. The Yardley plant has storage for 1100 bbl. of cement and the downtown plant 1500 bbl.

The company has begun using Haydite from the Smithwick plant at Portland, Ore. As a consequence, fa-



Test cylinders are cured by immersion in this water tank, located in the mixing plant



The dial scales have been provided with a 3-pronged indicator that enables the operator to batch fractional yardages without calculating

ilities may be added for premixing concrete for monolithic construction.

Personnel

W. M. Murphy is president of the Central Pre-Mix Concrete Co. and Herbert D. Sullivan is vice-president. John W. Murphy is secretary-treasurer. The latter is a director of the National Ready Mixed Concrete Association and the National Sand and Gravel Association.

Semi-Automatic Block Production

ACME BLOCK CORP., Milwaukee, Wis., has completed its expansion program, the main feature being the development of a semi-automatic block production line. Under the new system, four men can produce 10,000 block on a 10-hr. shift; the plant is operating on a 2-shift basis. Rudolph Kuper is president of the company.



Hand-operated hydraulic compression testing machine, 100-ton capacity

Fireproofing with Perlite

PERLITE INSTITUTE, New York, N. Y., is distributing a pamphlet entitled "Fireproofing with Perlite," giving a large amount of basic information on perlite plaster and concrete. Listed are 17 fire resistance ratings by A.S.T.M. standard methods.

The report states that steel column, girder, beam and floor protection have received Underwriters' Laboratories ratings up to 4 hr. for different thicknesses of perlite-gypsum plaster on metal lath. Concrete masonry units for non-bearing wall or partition use made of 4-in. hollow perlite block have been accorded a 4 hr. rating also. Wood joists and wood studs with perlite-gypsum on metal lath and plaster board bases have been given ratings of up to 1 hr. The pamphlet tabulates the rating tests and the original source of information that may be obtained.



Sand and gravel concrete block office of Janesville Sand and Gravel Co. Exterior of the building has been painted with portland cement paint

Gravity flow of materials featured at both block and ready-mixed concrete operation of Janesville Sand & Gravel Co., Janesville, Wis.

Integrate Concrete Operations At Sand and Gravel Pit

JANESVILLE SAND AND GRAVEL CO., Janesville, Wis., had its origin in 1907 as a concrete block and shingle company that operated a small sand and gravel pit to supply its own needs. It wasn't long until management discovered that there was a better market for sand and gravel than for concrete products. In approximately two years after its founding the concrete products operation was dropped and full attention was given to production of sand and gravel.

From 1912 to 1940 the company operated three sand and gravel yards in Milwaukee. In 1928 it commenced serving the Milwaukee area with ready-mixed concrete in what is believed to be the first commercial venture into the ready-mixed concrete field in the state of Wisconsin. The early trucks were open-type mixers of 1½-cu. yd. capacity with revolving mixer blades driven by power take-off.

In 1940 the aggregate yards and ready-mix operation in Milwaukee were closed and the company moved its fleet of concrete delivery trucks to Janesville, scene of present operations. Since that time the company has wholesaled its aggregates in the Milwaukee market.

The present ready-mixed concrete plant and equipment bears little resemblance to its predecessor and boasts of an operation comparable to any in the United States located in a town the size of Janesville (with a population of about 26,000).

The batching floor of the plant is situated at a point approximately 45 ft. down the side of a worked-out section of the pit and immediately adja-

cent to the sand and gravel plant on the surface. Sand and gravel are dumped directly into overhead bins by company trucks that back out a ramp from surface level. There are two aggregates bins totaling 100-ton capacity. Bulk cement is likewise dumped directly into a 50-ton cement bin by a company-owned dump truck. Bulk cement cars are spotted on a company siding approximately 300 ft. distant from both the ready-mixed concrete and the concrete block plants. Standard portland cement is used for both operations. Cement is dumped to a track hopper from where it is transferred to a screw conveyor which discharges into a bucket elevator for lift into an overhead bin with sufficient capacity to hold two car loads of cement. The company maintains a

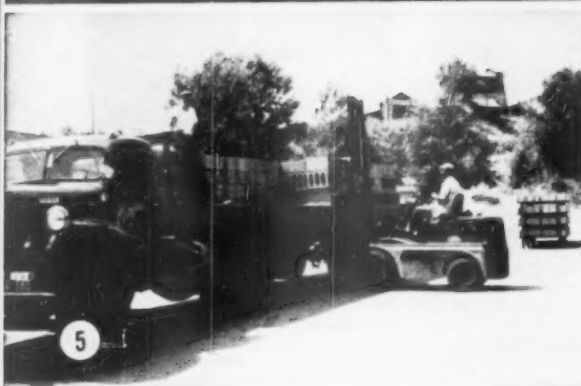
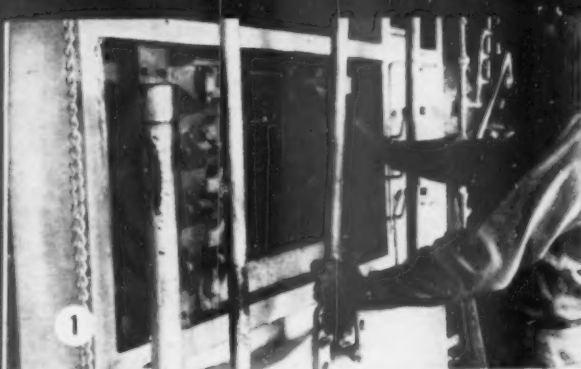
dump truck with a specially built body solely to make the haul of cement from this bin to the two batching plants.

Aggregates and cement are proportioned to transit-mix trucks in a weigh batcher and water is measured by meter. An air-entraining agent can be added by a special dispenser when the customer requires it. Water and sand for winter operation are heated by an oil-fired boiler.

At the present time the company is operating eight drum-type concrete delivery trucks: five of 5- and three of 3½-cu. yd. capacity. The 3½-cu. yd. units are mounted on 4-wheel trucks and the 5-cu. yd. units are mounted on tandem-axle trucks. Four of the newest trucks are of cab-over-engine type. George Meyer is foreman of the ready-mixed concrete batching plant.



New sand and gravel block building for housing building materials such as steel sash and mesh, plaster, cement paint, etc., which the company will handle as a service for its block dealers. The building is located at one side of the paved block storage yard. Office may be seen, left background



No. 1: Operator at weigh batcher controls in ready-mixed concrete plant. No. 2: Off-bearing block from one of two block machines. Note block rack spotted on turntable. No. 3: Platform truck removing block from curing room. No. 4: Block storage yard, showing block piled five cubes high. Block plant, rear, and company office building, upper right. No. 5: Loading cubes of block onto truck of long-distance contract hauler. No. 6: Cubing operation. Note 4-in. block cubed on base course of 8-in. block to facilitate fork-truck handling.

Block Plant

Production of sand and gravel concrete block was started in a worked out portion of the pit below the sand and gravel plant in February of 1946. Overhead bins and one block machine were set up in the open. First block produced were used to build a plant building which was finished by late summer of the same year. A second automatic block machine was installed in 1947. The plant produced only sand and gravel block until June of 1949, when production of lightweight units was started.

Both the ready-mixed concrete operation and the concrete block plants

enjoy favorable production costs for two principal reasons: production of aggregate in a company-owned plant and gravity flow of material which eliminates high material-handling costs.

The concrete block operation is similar to the ready-mixed concrete operation in that aggregates and cement are dumped into overhead bins by trucks from a ramp of similar design. There is provision in the bin arrangement of the block plant to store lightweight aggregate.

Under the aggregate bins a traveling weigh batcher dumps proportioned aggregates and cement to either of

two 42-cu. ft. mixers. These mixers are located on a mezzanine floor directly over two block machines of 4500 block per day capacity each. Each machine has two turn tables located immediately in front of them and on which are spotted block racks of 72 block capacity. Air-operated off-bearers are used to transfer block from the machines to the racks. A platform-type lift truck transfers loaded racks of green block from the machines to the curing rooms. This same truck also transfers racks from the curing rooms to the cubing area the next day.

An oil-fired boiler supplies steam for block curing, which is introduced into

the kilns by a 2-in. pipe down one side of the kiln at floor level. This pipe is drilled with 1/32-in. holes 2 ft. apart. Radiant heating pipe are also provided that extend the full length of each kiln at a mid point on one wall. During summer months no steam is provided, but after the block are placed in the curing room, metal doors are closed and from the heat generated by the block, temperature in the room rises to about 165 deg. F. Curing cycle in winter time follows roughly that recommended by the N. C. M. A. and in summer the block are left in the closed curing rooms over night. Ducts and fans are provided for exhausting the kiln in winter operation. Oscar L. Jensen is foreman of the block plant and Paul Fanning is assistant foreman.

A large paved storage yard has been provided that is about 1½ acres in area and is paved with 6 in. concrete.

After the block have been cubed they are stockpiled by a 5-prong fork lift truck. Stock piles are stacked 5 cubes high (or 20 block). The plant produces 4-, 8-, 10-, and 12-in. modular block of both sand and gravel and lightweight aggregate. Also produced are many special block such as two sizes of chimney block, bull-nose block, corner block, etc. Cubes of 4-in. block are built on a base of 8-in. block so that they may be handled by the fork truck. It has been found by the company that the customer almost invariably wants these extra 8-in. block.

Three flat bed trucks, company owned, are used for block delivery. A contract-hauler delivers block to outlying areas with three large semi-trailer trucks. All trucks are loaded with cubes by fork trucks. Block are distributed in an average radius of 60 miles, and are sold through 110 dealers. Approximately 40 percent of the block production goes to the farm trade.

All block are held in the yard a minimum of 30 days. Orders have been turned down rather than violate this principle. Due to the fact that sand and gravel from the company-owned deposit is of excellent quality, the company has been able to maintain its reputation for high quality products in production of concrete block.

All bins and weigh batchers in both concrete operations are of Butler manufacture and the eight drum-mixer bodies in use plus two for standby were manufactured by Jaeger. Five of the eight trucks carrying transit mix bodies are of Mack manufacture, with four of these being of the cab-over-engine design and the remaining four are International. A Dares air-entraining agent dispenser is located on the weigh batcher floor. Mixers in the block plant are of Stearns manufacture, as are the two No. 9 Joltercrete block machines. Platform-type lift trucks are of Erickson manufacture, while Clark gasoline-powered fork lift trucks are used in the cubing operation. The three trucks used for block

delivery are a Mack, an International, and a G. M. C. Waylite is the lightweight aggregate used at this plant. Two Electro-Visors are on order for installation on the two Joltercrete machines. These height-controlling devices are principally required in the production of lightweight block.

A fourth division of the company is known as the Hard Materials Division and handles such items as steel mesh, expansion joints, cement paint, etc. This division is housed in a new sand and gravel concrete block building adjacent to the paved yard of the block plant.

The company will deliver these hard building materials along with block as a service to small-town dealers, who therefore will not have to stock items that are apt to move slowly. In addition, this service provides block dealers with a quick source of supply for all these materials which eliminates waiting possibly a matter of days for a delivery from Milwaukee or Chicago.

Officers of Janesville Sand and Gravel Co. are J. K. Jensen, president; J. R. Jensen, vice-president; G. F. Ehrlinger, secretary; and E. E. Jensen, treasurer.

Small Plant Makes Perlite Block



Adding lightweight aggregate to 50-cu. ft. mixer

BOTH LIGHTWEIGHT and crushed stone block are produced on two tamping machines of 1500 block capacity each per 8-hr. shift at Scott County Concrete Products Co., Vienna, Ind., near Scottsburg. Located in the southwestern corner of the state, this plant divides its sales about 50-50 between rural and industrial markets.

Bagged cements are used of both standard and air-entraining types, which are delivered by box car to the company's siding, permitting unloading directly to the mixer floor. Bagged cement is removed from cars, stored and transferred to the mixer as needed on wooden pallets. Sand and crushed limestone are delivered to the plant by company truck. Heavy aggregates are elevated to bins above the mixer by a bucket elevator, while expanded perlite, used for lightweight aggregate, is stored on the floor near the mixer. The lightweight aggregate is furnished by Airlite Processing Corp., whose expansion unit is located on the same property as the block plant.

Batch Mixers

One of the block machines is served by a conventional 12-cu. ft. batch mixer, driven by V-belts from a 15-hp. Continental gasoline engine, with con-



Removing a block from tamping machine

crete being elevated to the machine hopper by an elevator belt. The second machine, of identical design, is served by a continuous mixer. Both block machines and both concrete mixers are of Kent Machine Co. manufacture. Production is almost totally confined to 4- and 8-in. modular units. Plans are being made now for installation of steam curing rooms. The block plant is located in an old factory building, allowing for 10,000 sq. ft. of covered storage space.

Also handled by the concrete products company is a line of building supplies, sand and gravel which are delivered along with block in the company's six trucks, mounted with dump or flat-bed bodies. Fred L. and Thomas B. Everitt are partners in the firm, with the last named acting as plant manager. Thomas Everitt is also secretary-treasurer of Airlite Processing Corp., the concrete products company's source for lightweight aggregate.



(Above) Watching for the first cracks to appear in the prestressed concrete railroad trestle slab loaded to failure in the 1,000,000-lb. capacity testing machine at the Portland Cement Association's Research laboratories on September 20. The "switchboard" in foreground was used to take readings from more than 100 strain gauges located throughout the slab. (Right) Lowering a bridge strand into position in the trestle slab form during its construction. Method of securing strand sockets in end plate can be seen at lower right. Strands were post-tensioned to 120,000 p.s.i. by means of a hydraulic jack.



P.C.A. Tests Precast Railroad Slab

IN TESTS OF immediate interest to engineers in this country, a prestressed concrete railroad trestle slab approximately one-half the depth of a conventional reinforced concrete slab of the same length and width was loaded to failure at the Portland Cement Association's new Research and Development Laboratories in Skokie, Ill. on September 20.

In the tests a full-size slab 25 ft. long, 7 ft. wide, 1 ft. 6 in. deep and designed for an E-72 live load plus full impact, withstood a load of 480,000 lb. before failure. This was equal to approximately 2.8 times live load and impact.

The trestle slab was built at the P.C.A. laboratories in cooperation with the Association of American Railroads and the John A. Roebings' Sons Company. It weighed 20 tons and contained 10 cu. yd. of concrete with a strength of 7000 p.s.i. at 28 days. Prestressing was done with 15 bridge strands 1 1/2 in. in diameter, post-tensioned to 120,000 p.s.i.

Test Procedure

Before the demonstration, brief talks were made on prestressed concrete, the prestressing strands and end connections, equipment for measuring strains in concrete and reinforcement, and the design and construction of the slab. The tests were then carried out in several steps.

A strand and socket connection was tested in the association's 400,000-lb. capacity testing machine. A tensile force of 255,000 lb. or 228,000 p.s.i.

was required to break the strand, which was composed of 37 5-mm. high-tensile strength steel wires encased in a plastic tubing. At the test load there was no evidence of failure of the end connections.

The prestressed slab was loaded to full design load in the 1,000,000-lb. capacity compression testing machine. The load was then increased until the first hairline crack appeared at approximately 1 1/2 times live load and

impact. Upon removal of the load the crack disappeared entirely, indicating the complete elasticity of the slab. Finally the slab was loaded until failure occurred in the upper portion at 2.8 times the design load.

As each load was increased, readings of the 100-odd strain gauges located throughout the slab were read at the central "switchboard" especially developed for the tests. Deflections of the slab were also noted.

Variations in Strength of Concrete Cylinders

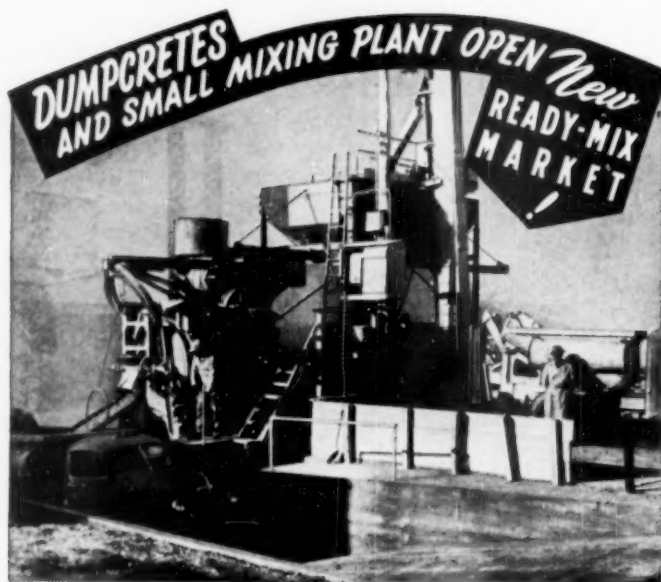
THE EFFECTS OF WATERTIGHTNESS of molds and methods of rodding 6 x 12-in. concrete cylinders were the subjects of a project conducted recently at the laboratory of the National Ready Mixed Concrete Association in Maryland, in conjunction with the National Sand and Gravel Association. Strengths and uniformity of strengths were compared for watertight (sealed) and non-watertight (unsealed) metal cylinder molds and for cylinders rodded the standard number of times in the usual fashion and rodded using a special device.

The first comparison was suggested by the requirement of A.S.T.M. Standards that "assembled molds of any type shall be watertight," a condition the report states is not always attained. The second comparison arose out of a suggestion that erratic

strengths frequently may be attributed to non-uniform and inadequate rodding during the molding of the cylinder and from the development of the special device noted above.

The tests, made with three classes of concrete, indicated that unsealed molds gave consistently higher compressive strengths than sealed molds, and that the usual method of compacting compression test specimens provided for in A.S.T.M. Methods C 31 and C 192 is adequately uniform when performed by persons familiar with the procedure.

COLUMBIA BLOCK CO., Tucson, Ariz., under the management of Sgt. Jack Stewart, owner, and Carl Shurtz, has begun operations at its new plant which has a capacity of 5000 block per day. Besides building block, the plant also produces window sills, stepping stones and capping block.

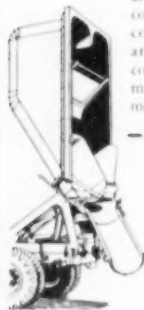


A total investment of only \$18,000 opened up a brand-new ready-mix market of farmers and local contractors in Winterset, Iowa (pop. 4000).

Concrete Products Co. bought a paver, a bin hatcher, a bucket elevator and two Dumpcretes. With this complete operation they can control mixes accurately and deliver air-entrained concrete that is superior to much mixed today by other methods.

Their low cost, non-agitating Dumpcretes mount on light trucks, load fast and discharge fast or slow—through a long, 15-foot chute. Neither segregation nor bleeding is a problem. Mont C. Johnson of Concrete Products Co. says, "Fifteen and 20 mile hauls are commonplace. . . We have had excellent acceptance of our product."

You are sure to want the details of this efficient ready-mix operation that delivers 50 to 100 yards a day. Mail the coupon today. There's absolutely no obligation.



The lower cost Dumpcrete is lightweight, watertight, with 13-foot chute, controlled higher discharge and lower center of gravity. Hauls sand, gravel, and coal too.

Please send NEW booklet showing Dumpcrete savings.

Name

Firm

Address

DUMPCRETE

DIVISION
Maxon Construction
Company, Inc.

500 Talbott Bldg., Dayton 2, Ohio

Expansion Joint for Concrete

OWENS-CORNING FIBERGLAS CORP., Toledo, Ohio, has announced development of a Fibreglas expansion joint for use in concrete work. An asphalt-impregnated, bonded glass wool board, faced on both sides with a heavy asphalt-saturated kraft paper, the expansion joint has been designed for use in concrete highways, canals, sidewalks, airport runways and wherever concrete pavements are used in large areas.

During a weathering test, the expansion joint showed no disintegration when subjected to freezing and thawing. Durability is said to be due to the bonding of glass fibers, in a new process, with resins and blended asphalts. Other features listed by the firm include a weight one-third less than that of most joints.

Gypsum Production

DOMESTIC MINE PRODUCTION of crude gypsum was 1,922,827 short tons during the second quarter of 1950, the greatest tonnage produced in any quarter on record. Imports of 701,789 short tons exceeded any previous second-quarter period, and the total apparent supply of crude gypsum for the first six months of 1950 reached 2,624,616 short tons. The 1,767,734 short tons of calcined gypsum produced during the quarter also was a new record.

Efficient Pipe Delivery

UNIVERSAL CONCRETE PIPE CO., Columbus, Ohio, effected a truck-to-trench delivery with 72-in. reinforced concrete pipe on a recent \$200,000 storm sewer project in Columbus. The contractor advised the Universal plant when more pipe was needed and sections arrived at the job site on schedule, eliminating the usual street stacking and double handling.

N. W. WILTGEN AND SONS, construction and sand and gravel firm, has added a ready-mixed concrete plant to its Le Mars, Iowa, operation.

Why Miss \$60 a Day Additional Profits?

At least \$60 a day additional profit is being made by vibrapac operators who subscribed to OSWALT SERVICE six months ago.

The investment is paid off; production has been stepped up 25%; labor costs per unit has been reduced and they are getting a higher quality block.

Investigate TODAY—Write or phone for OSWALT SERVICE plant nearest you. Every client an enthusiastic satisfied customer.

OSWALT ENGINEERING SERVICE CORPORATION

1335 Circle Ave.

Phone Forest 6-3898

Forest Park, Ill.

Washington Masonry Producers Hold Meeting

CONCRETE PRODUCTS ASSOCIATION OF WASHINGTON held its annual fall meeting September 8-9 at Yakima. Among the topics considered were pension plans, irrigation in the Yakima Valley, meeting sewer pipe specifications, and block specifications with particular reference to moisture content. At the dinner, Rev. Reeter W. Johnson spoke on "A Glimpse of Post-War Europe." H. C. Lutes, Layrite Concrete Products, is president of the association.

Buys Concrete Pipe Plant

PONTUSCO CORP., Burlington, N. J., has announced the purchase of United Concrete Pipe Corp., Baldwin Park, Calif. The latter has a large permanent plant for the manufacture of concrete pressure pipe and has extensive shop facilities for the manufacture of heavy pipe and handling equipment. Other pressure pipe plants are located at Stockton, Calif., and Pleasant Grove, Utah. The corporation also operates seven plants in California for the manufacture of low pressure concrete pipe for sewer, drain and irrigation service.

Vertically poured reinforced concrete pressure pipe with either a steel cylinder, a cage of reinforcing steel, or both are produced as well as centrifugally cast pressure pipe, either with a steel cylinder or cage reinforcement. Also, concrete pipe are cast without reinforcement for very low pressure service. They are made in diameters of 4 to 180 in.

Recently, United completed the manufacture of 9000 ft. of 180-in. diameter reinforced concrete pipe for the U. S. Bureau of Reclamation's Central Valley project at Tracy, Calif. The pipe was used for triple discharge lines from the pumping station to the Delta-Mendota canal 197 ft. above the pumping station.

Pontusco Corp. is a Delaware corporation with offices presently located at Burlington, N. J. and New York, N. Y. It is jointly owned by the United States Pipe and Foundry Co. and by Compagnie de Pont-a-Mousson of Nancy, France. H. Lloyd Nelson is president.

Pumice Block Plant

SUPERLITE MATERIALS CORP. has started production of pumice block at Albuquerque, N. M. The new corporation, which is in line for a \$50,000 government loan, is headed by Roy L. Cook, president; David Wallace, treasurer, and Gilbert Olson, secretary. The corporation was formed from a merger of interests of Pumex Corp., Builders Supply Corp., both of Phoenix, Ariz., and the Superlite Corp. of Calipatria, Calif. Mr. Olson will be in charge of operations at the new plant which will have a capacity of 40,000 block per day.

Biggest Materials Handling news in years

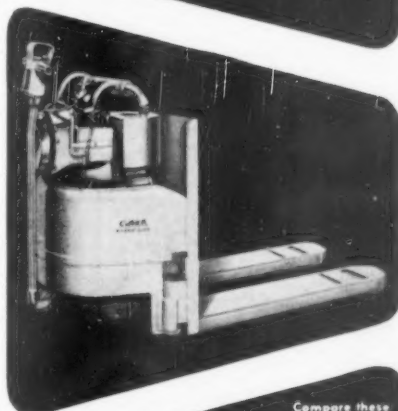
CLARK'S REVOLUTIONARY *New* POWERED HAND TRUCKS

• GAS OR ELECTRIC POWER • SHORTEST TURNING RADIUS •
MORE POWER! • MOTORS IN THE DRIVE WHEEL



1 Electro-Lift

New-type compound motor develops more power than any other electric truck. Ample reserve power—high gradability. Automatic acceleration. Soft, dynamic braking. Requires minimum operator effort because speed variations are negligible. 19-plate batteries.



2 Hydro-Lift

Gas-engine drives variable-displacement hydraulic pump which drives constant-displacement hydraulic motor with unequalled smoothness and controllability. 24-hour ramp service. Automatic torque multiplication—big reserve power. Effortless finger-tip positioning of directional controls.

One Basic Design

Same rugged frame for both power types. Shortest wheelbase. Larger (14") drive tire carries greater share of load—lessens weight on rollers—less wear on rubber and floor. Greatest underclearance. Compact drive unit fully enclosed. Largest main carrier bearing of all hand trucks.

Compare these great new machines with all others—as to what you get for your money! To get all the facts, send for our

hand-truck booklet—yours for the asking. Use the coupon.



CLARK FORK TRUCKS
ELECTRIC AND GAS POWERED
AND POWERED HAND TRUCKS • INDUSTRIAL TOWING TRACTORS



INDUSTRIAL TRUCK DIVISION • CLARK EQUIPMENT COMPANY • BATTLE CREEK 47, MICH

Please send New Powered Hand Truck Book

Name

Firm Name

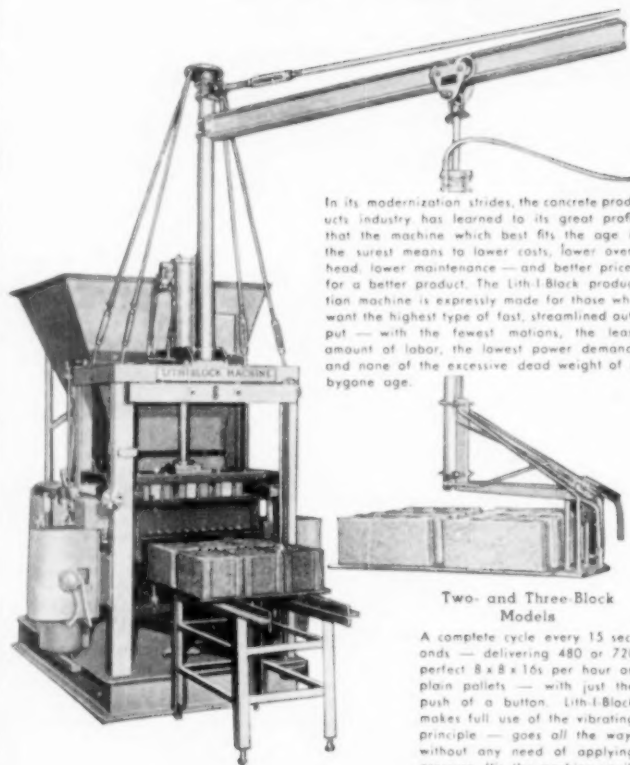
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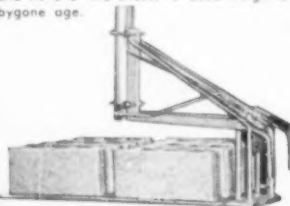
Authorized Clark Industrial Truck Parts and Service Stations in Strategic Locations



IN THE CONCRETE PRODUCTS INDUSTRY *Lith-I-Block* IS THE MACHINE THAT **FITS THE AGE**



In its modernization strides, the concrete products industry has learned to its great profit that the machine which best fits the age is the surest means to lower costs, lower overhead, lower maintenance — and better prices for a better product. The Lith-I-Block production machine is expressly made for those who want the highest type of fast, streamlined output — with the fewest motions, the least amount of labor, the lowest power demand, and none of the excessive dead weight of a bygone age.



Two- and Three-Block Models

A complete cycle every 15 seconds — delivering 480 or 720 perfect 8 x 8 x 16s per hour on plain pallets — with just the push of a button. Lith-I-Block makes full use of the vibrating principle — goes all the way, without any need of applying pressure. It's the machine you'll eventually come to — so why not now!

Write for descriptive literature and names of nearby users.
LITH-I-BLOCK COMPANY
HOLLAND, MICHIGAN

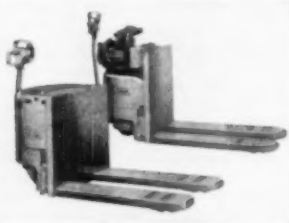
Dept. CP 11

NEW MACHINERY

Power Hand Trucks

CLARK EQUIPMENT CO., Battle Creek, Mich., has brought out hand trucks in two power types but of one basic design. One of the new trucks, the Electro-Lift, is battery-powered with motor drive; the other, the Hydro-Lift, is gasoline engine-powered with hydraulic pump and motor drive.

The company lists the following features of the new units: compact design, high maneuverability, motor



New design hand trucks of 6000-lb. load capacity, available in either electric or gasoline power models

mounted in the drive wheel, large power reserve, and accessibility for ease of maintenance.

The battery-powered model is driven by a GE compound motor which develops 1 1/4 hp. The motor is mounted inside the 14-in. drive wheel, and the output shaft drives through a triple reduction of 32:1 into an internal gear attached to the wheel. The motor maintains almost uniform speed on levels, whether the truck is loaded or empty, the manufacturer claims. The brake is self-energizing of the external contracting type.

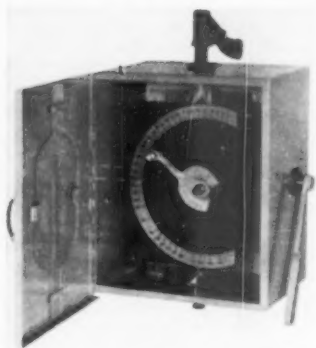
The gasoline engine model has what the manufacturer claims is an extremely smooth drive. The engine drives a hydraulic pump and motor, the latter again located in the drive wheel. The hydraulic pump is the eccentric vane type with infinitely variable displacement from 0 to 15 g.p.m. The same frame is used for both models.

Dispenser for Air-Entraining Agents

TECHKOTE Co., Inglewood, Calif., has introduced a dispenser, known as the Techkote Mach Automatic Dispenser, for air-entraining agents. The unit operates by passing the liquid agent through a bag which is alternately opened and closed at top and bottom by a tripping mechanism. This release can be actuated either by hand, or by mechanical means in connection with the water discharge to the concrete mix. The quantity discharged can be dialed in units of ounces.

Some of the outstanding features of the dispenser listed by the producer are: no internal moving parts work-

ing in air-entraining agent; no air vents; no pistons; no packing glands or nuts; no gumming; no lubrication



Automatic dispenser for air-entraining agents

required; instant and accurate selectivity of quantity desired with a range of 3 to 40 ounces; positive opening and closing; and fast discharge. All of the working parts of the dispenser are made of stainless steel, and other metallic parts are treated for prevention of corrosion and rust.

Small Lift Truck Added

HYSTER Co., Portland, Ore., has introduced a new 2000 lb. capacity lift truck to its line of industrial units. It is powered by a Wisconsin air-cooled



New 2000 lb. capacity lift truck

engine which operates at relatively low temperatures. The company lists new engine changes as: new intake manifold, redesigned shrouds to pull cool air from the sides of the machine rather than from top or bottom, a new electric fuel pump, and a new distributor.

The manufacturer claims that a new clutch provides smoother control and has greater life than comparable units. The lift truck is available with special purpose attachments such as scoops, booms, guards, towing hooks, and others.



IN THE BUILDING FIELD

The CONCRETE MASONRY UNIT
THAT BEST
FITS THE TIMES

After all, the only reason you have a block machine is to be in the business of making blocks that sell. If you want a building block that has more than a cellar future, more than a cheap market — then investigate Lith-I-Block! Lith-I-Block producers do not operate to a limited demand or a restricted market — they have the concrete masonry unit that best fits the times — one that is ideally made with the quality running true all the way thru — the kind of accuracy and uniformity and precision that gets it above the ground into the superstructures where the big volume is to be obtained — and where prestige is made for the Lith-I-Block producer. Why not ride the Lith-I-Block tide — it means more business coming your way! You'll get better quality blocks — and more to each sack of cement! Write for the convincing proof on Lith-I-Block superiority — and get in now while the getting is good.

LITH-I-BAR COMPANY

Dept CP 11-B HOLLAND, MICHIGAN



All Shapes and Sizes to Fit All Purposes
Adaptable to All Aggregates

Fork Truck for Outdoor Materials Handling

YALE & TOWNE MANUFACTURING Co., Philadelphia, Penn., has brought out a new pneumatic-tired fork lift gas truck for use over rough, uneven terrain such as might be found in building supply yards, or on construction projects, freight docks and other outside storage and shipping areas. The addition of oversized pneumatic



Gasoline-powered fork truck with oversize pneumatic tires for operation on rough terrain

tires in combination with other special features makes the "Yard King" particularly suitable to such applications, the company states.

In this unit, starting slip takes place in the fluid coupling rather than in the clutch. Other engineering features claimed by the company include automotive type controls, fully articulated rear axles, a hypoid drive at the rear axle, and an hydraulically operated lift and tilt. The frame of the truck is of all-welded construction. Four sizes of the fork truck are available with maximum load lifting capacities ranging from 4000 to 8000 lb.

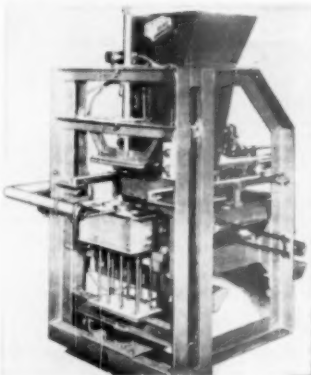
Masonry Saw Pump Introduced

CHAMPION MANUFACTURING Co., St. Louis, Mo., has brought out a new masonry saw pump for its models "R" and "P" wet cutting saws. The new pump carries a one year guarantee, the first such guarantee ever offered on a masonry saw pump, the company claims.

The pump does away with the extra belt and pulley formerly used, according to the manufacturer. It can be run dry without harm should the wet cutting models be used for dry cutting, the company also states. The pump is self-priming and has no seal or rubbing surfaces to wear out under the abrasive action of the coolant. Aluminum construction also resists corrosion, it is claimed.

Small Automatic Block Machine

KENT MACHINE Co., Cuyhoga Falls, Ohio, has announced a new air-operated block machine designed particularly for the small plant. The machine uses cored pallets. Equal delivery of aggregate to the mold box is aided by agitation, and vibration provides uniform block density, it is claimed. The new Standard Blockmaker incorporates a special press head; push button control starts the cycle and all operations are handled automatically in sequence.



Air-operated automatic block machine

extra white

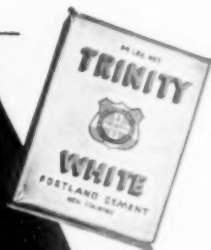
TRINITY WHITE Portland Cement

Use Trinity—the whitest white cement. A true portland cement that meets ASTM and Federal specifications. Trinity is first choice for architectural concrete units, terrazzo, stucco, paint and other uses. Regularly advertised to architects and other factors in the industry. Gives a pure white and true colors when pigments are added. Ask for Trinity White. Trinity Division, General Portland Cement Co., 111 W. Monroe St., Chicago; Republic Bank Bldg., Dallas; 816 W. 5th St., Los Angeles.

as white



as snow



TRINITY WHITE

is a

True Portland Cement!

Another Leader[★] IN THE PRODUCTS INDUSTRY PREFERS BESSER VIBRAPACS!



"This is the 85th of a series of ads featuring leaders of the Concrete Products Industry who are stepping up block production with Besser Vibrapak machines."

Terry Carpenter who operates the concrete products plant bearing his name.

Terry Carpenter Products Plant is Besser Designed and Equipped

Terry Carpenter, Ltd., Scottsbluff, Nebraska, is one of the few products plants in the United States using high pressure steam curing. This type of curing is ideal in the production of both concrete block and concrete brick. The company installed its first Besser Vibrapak in 1945 and the machine has been kept busy ever since. Sand-gravel and pumice are used as aggregate.

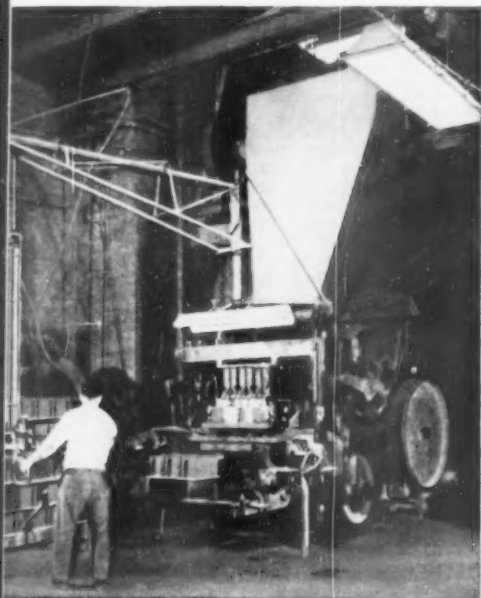
About 25% of the Terry Carpenter production is in plain and colored concrete brick. These are used for homes, commercial structures and farm buildings within a radius of 50 miles. About 48 apartment houses and 20 residences are entirely constructed with concrete brick . . . all units produced on this one Vibrapak machine.

Besser's Sales and Service Staff and Engineering Department are available to consult with you regarding your plant requirements in your area. Write today for further information.

BESSER MANUFACTURING COMPANY

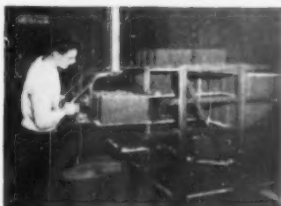
Complete Equipment for Concrete Products Plants

ALPENA, MICHIGAN, U. S. A.



The fully-automatic Besser Vibrapak at the Terry Carpenter plant. No machine operator required. Produces three 8 x 8 x 16 units at a time on one Plain Pallet. Other sizes in equivalent multiples.

(Right) Besser Block Cuber for cubing Vibrapak block. No lifting. The operator merely guides the hoist.



(Above) Green block being placed on rack with the help of a Besser Power Off-bearing Hoist.



Exterior view of Terry Carpenter plant. Note stockpiles of Vibrapak block.



BESSER

BATCH MIXERS

SKIP LOADERS

BLOCK & BRICK CUBERS

SUPER VIBRAPAC

AGLITE PLANTS

ACROW CENTERS

ROOF TILE MACHINE

Twenty-six TRANSPORT MIXER TRUCKS

on the job for Henry Nelch & Son Co.

Springfield, Ill.



The **TRANSPORT MIXER**
is an all-purpose unit, performing
equally well for central mixed
concrete and transit mixed concrete.

with **VISIBLE MIXING ACTION**
you see what goes on

WRITE FOR ILLUSTRATED BULLETIN



**CONCRETE TRANSPORT
MIXER CO.**

Phone
Flanders 7800

4987 Fyler Ave., ST. LOUIS 9, MO.

Serving the **CONCRETE INDUSTRY 20 YEARS**

Masonry Saw for Wet or Dry Operation

CLIPPER MANUFACTURING CO., Kansas City, Mo., has developed a factory-sealed water pump which can be operated dry with no damage resulting



New model masonry saw with pump (inset)
which can operate either wet or dry

to it. In operation, the operator turns the petcock on the outlet of the pump to change from wet to dry cutting. There is no need to disconnect V-belts, according to the manufacturer.

The pump may be added to previous model masonry saws, but the new model HD saw is equipped with the pump and a water application system. This system bathes the cutting saw and work, the company said.

LARGE PRODUCER ADVANTAGES

for Small and Medium Plants
assured by the
KENT STANDARD BLOCKMAKER

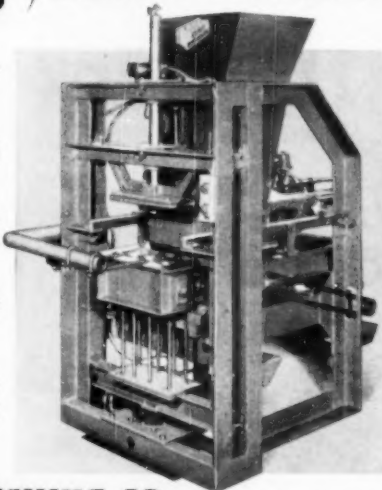
Produces 5 to 6 blocks per minute from any aggregate.

Agitation assures uniform delivery of aggregate to the mold box.

Vibration of mold box assures uniform density of blocks.

An ingenious press head assures smooth topped blocks of uniform height.

The push of a button starts the cycle during which the various operations are handled automatically in sequence.



This new semi-automatic machine brings to smaller operators all the high production and low cost advantages heretofore enjoyed only by large producers.

And it makes these competitive advantages available at an investment so small as to be within the means of almost every blockmaker to all of whom it assures greatly increased profit returns.

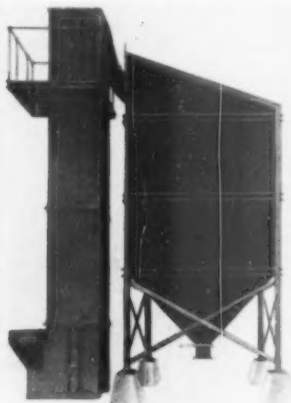
In fact, the many advantages may even justify you in replacing equipment of comparatively recent design. Write for complete information NOW.

**Manufacturers of
CONCRETE PRODUCTS MACHINERY
Since 1925**

The **KENT MACHINE CO.** • CUYAHOGA FALLS, OHIO

Bulk Cement Batching Equipment

MICHIGAN & SOUTHERN EQUIPMENT Co., Columbus, Ohio, has announced its line of bulk cement bins and batching equipment in 250- and 400-bbl. ca-



Cement storage units for products or ready-mix plants

capacities. Both sizes are 8-ft. 10-in. square and are of all-welded construction. All major parts are assembled before shipment. Either bucket or vertical screw elevators are available. These have capacity in excess of 250 b.p.h.

The units are provided in "packaged" form for concrete products plants and with extended legging and weigh batching equipment for truck mixer charging. Capacities of 500, 650 and 800 bbl. storage can be provided with recirculation systems, the company states.

Precast Concrete Fireplaces

F. W. FLOWERS, president of General Engines Co., Inc., Gloucester, N. J. has announced a new process for



Precast fireplace made by new process

making a precast masonry type outdoor fireplace or grill. The process includes a set of precision molds and a new technique for fabricating. The fireplace comes in eight precast pieces

COMBINATION CEMENT AND AGGREGATE PLANTS (100 to 300 tons)
STATIONARY BULK CEMENT PLANTS (100 to 200 tons)
PORTABLE BULK CEMENT PLANTS (100 to 750 tons)
STATIONARY AGGREGATE PLANTS (100 to 500 tons)
PORTABLE AGGREGATE PLANTS (30 to 100 tons)
AGGREGATE STORAGE BINS (65 to 200 tons)
CONCRETE BUCKETS (1/2 to 2 cu. yds.)

WHICHEVER WAY YOU LOOK AT IT —

HELTZEL BUILDS IT BETTER

On every point of comparison Heltzel batching plants are better built. Engineered for the most efficient and economical production of lower cost Concrete. Constructed for trouble free service and long life. Write for complete information.

HELTZEL STEEL FORM & IRON COMPANY

WARREN, OHIO, U. S. A.
1750 THOMAS ROAD

New
UNIT 1520
Self-Propelled
RUBBER-TIRED
CRANE



**20
TON
CAPACITY**

COMPLETELY
CONVERTIBLE

TO ALL
ATTACHMENTS

Built by modern precision methods, the UNIT 1520 leads the field in quality, and dependable performance. Designed for both "on and off" highway operation. So compact, it works efficiently even in small, cramped quarters, "in or out" of the yard. Heavy Duty, yet operated with remarkable SPEED . . . SAFETY . . . ECONOMY!

- Rugged Construction
- Perfectly Balanced
- Hook Roller Construction
- Operated by ONE Man
- Hydraulic Steering
- Powered by ONE Engine
- Air Brakes and 4 Speed Air-Actuated Transmission



UNIT 1520 can be equipped with retractable high A-Frame to permit capacity loads on extended boom at long radius.

UNIT CRANE AND SHOVEL CORP.

6431 WEST BURNHAM STREET • MILWAUKEE 14, WISCONSIN, U. S. A.



SHOVELS • DRAGLINES • CLAMSHELLS
 CRANES • TRENCHES • MAGNETS

ROCK WOOL

We specialize in the designing of plants and the manufacture of equipment used in the production of rock wool.

With many years experience in this field, we are prepared to offer exceptional service to those interested in rock wool production.

Your inquiries are solicited.

ROCK WOOL ENGINEERING CO.
 Wabash P.O. Box 291 Indiana

of concrete in a rough natural and colorful fieldstone finish. A standard firebox assembly is used for the grill. The four sides are placed directly on a concrete base slab that is part of the assembly, and thus eliminates a prepared foundation. Since the fireplace is made sectionally, it is easy to transport and handle. Approximately 20 minutes are required for an installation.

Compact Electric Lift Truck

CLARK EQUIPMENT Co., Battle Creek, Mich., has introduced the latest model in its electric carloader line of fork trucks. This is of 3000-lb. capacity with a 24-in. load center. The



Automatic acceleration features new lift truck

company states that one highlight of the new unit is an automatic acceleration feature, providing smooth and even variations of motor speed. The acceleration is accomplished through a master power-switch regulated by an automatic timer. Driving is similar to that of an automobile equipped with automatic gear shifting, according to the manufacturer.

Another feature of the new lift truck listed by the manufacturer is a separate motor which powers the hydraulic pump. Lift heights are in a range from the standard 84 in. with overall height of 61 in. with forks down, to 130 in. and an overall height of 84 in. with forks down.

Available Soon

THE MULTICO "LITTLE BEAVER"

*New High Speed Low Cost
 Concrete Block Machine*

**THE MULTIPLEX MACHINERY
 CORP.**
 ELMORE, OHIO

It's Easy to Make \$\$\$ with
**MARVEL JR. DRAIN
 TILE MACHINE**



Wonder working Marvels will put you in BIG PROFITS fast. Few days operation will more than pay for machine. No plant is complete without a Marvel, Jr. Now in use from coast to coast and in Ireland. Marvel is equipped with 3, 4, 5 or 6 inch attachments. Extra equipment allows you to make all type fittings also. Heavy duty sealed ball bearing $\frac{3}{4}$ H.P. motor.

We are largest manufacturers of SPECIALTY MOLDS FOR CONCRETE

No Shop is complete without Marvel, Jr.

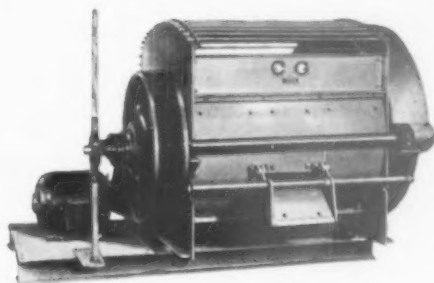


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 Complete
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CONCRETE MACHINERY CO.
 Box 2248 Hickory 5, N. C.

THE FAMOUS C. G. MIXER

Sizes . . 14 . . 24 . . 36 . . 50 cf capacity



Equipped with . . .

Abrasion Resisting steel liners
 Seal Master Ball Bearings
 Famous Lemley clutch
 Motor and V. belt drive or
 clutch pulley drive

Write for literature and prices

CHAS. GATZKE MFG. CO.
 930 North Avenue . . . Des Plaines, Illinois

**COMMERCIAL
 PALLETS**

Produce Units With Sharp Edges !
 Are Less Expensive !

LAST a LIFETIME

*"More in use
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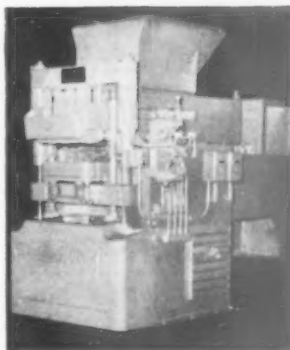
**The COMMERCIAL SHEARING &
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 YOUNGSTOWN, OHIO.

**YOU'LL MAKE MORE BLOCKS
 WITH A *Columbia!***

**HERE'S
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- PLAIN PALLETS
- VIBRATION PLUS COMPRESSION
- 4-6 AND 8 INCH HIGH BLOCKS
- 4 TO 6 PALLETS PER MINUTE
- OIL HYDRAULIC
- ANY TYPE OF AGGREGATE
- AUTOMATIC OR SEMI-AUTOMATIC

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CLASSIFIED ADVERTISING

SPACE HEATERS

War Surplus Bargain New — Ready To Use! 40,000 BTU capacity

— Burning gasoline, kerosene or diesel fuel.
— Electric blower — 12 V. DC or 110 V. AC
using small transformer, furnished with
heater.

Portable, Quick, Clean Heat
Ideal for curing room, concrete plants, work
under construction, emergency heat, or auxil-
iary heaters.

\$95.00 each

Clapp, Riley and Hall Co.

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FOR SALE

Besser K-3 Tamper with Vibrating Mold
Box Complete with attachments. At a give-
away price—overhauled and ready to go.

DINABURG BLOCK CO.
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FOR SALE

10 20" and 40" dumpcrete bodies complete
with rams, pumps and valves. Excellent
condition, priced from \$500.00 to \$1200.
00 or less than half of original cost.

IMPERIAL READY MIX CONCRETE CO.
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CONCRETE BRICK COLORS CEMENT COLORS MORTAR COLORS

made by
BLUE RIDGE TALC CO., INC.
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Champion Drain Tile Machine. Excellent
condition. 4" 5" 6" and 8" attachments.

DAMHORN BROS. CONCRETE BLOCKS
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PACKER-HEAD WINGS

Both McCracken Type and Martin
Trowlers—PROVED to last as long or
longer — yet cost considerably less.
Write for prices.

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ANTHRACITE CINDERS

A car load or a train load. Our supply is
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Call or write.

ROY P. MCINDOE COMPANY
105 Mace Avenue, Baltimore 21, Md.
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FOR SALE

2 Yale & Towne Hand Lift Trucks—
1 Stearns Clipper Striper with 8" Mold
Box—All in Good condition—Cheap.

CONCRETE PRODUCTS CO.
Pitman, N. J.

BLOCK EQUIPMENT FOR SALE

- 1—Used New Holland Crusher
(complete with motor) — \$ 700.00
- 1—Used Multiplex Mixer (com-
plete with motor, new liners,
new blades) — 700.00
- 1—Used bucket elevator (com-
plete with motor) — 700.00
- 1—Clipper Masonry Saw (with
1 1/2 HP motor—this practi-
cally new!) — 185.00
- * Enough new steel angles
and channel cut to size to
make seventy 60-block Racks
as specified by the Lith-I-Bar
Co. — 1100.00

*NOTE: At this figure each rack would cost \$15.00
plus freight, whereas they presently cost ap-
proximately \$25.00 F.O.B. Midway. With ex-
cess in steel this is at least a \$2000.00 value in
return.

**WE ARE NOT GOING INTO BLOCK BUSINESS
AS WAS ORIGINALLY INTENDED — FIRST
\$3,000.00 OFFER TAKES EVERYTHING LIST-
ED. ALL LISTINGS ARE IN WORKING CON-
DITION AND COMPLETELY DISMANTLED
EVERYTHING FOR AND SUBJECT TO PRIOR
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BUDD ATTICK

c/o Arenal Farms
Shoemakersville, Pa.
PH: Hamburg, Pa. 2504 — or
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FOR SALE

Hendley & Whittemore plate bend-
ing rolls 96" between housings. Box
J-1, Rock Products, 309 W. Jack-
son Blvd., Chicago 6, Ill.

FOR SALE

1—Model 9 Jolterete including 8" Mod-
ular attachment with off-bearing
hoist
4000—8" Modular pressed steel pallets
Code Cake

THOMAS W. NOBLE CO., INC.
520 N. Michigan Ave., Chicago 11, Ill.

FOR SALE

Jackson & Church Six Pocket Brick
Press. Good as new. Can be seen at
any time.

W. N. HALL & SON
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FOR SALE

Pumice, a superior light weight aggre-
gate for cement blocks, walls, floors,
roofs, plus insulation against heat and
cold. Pumiceite aggregate for acoustical
plaster, ten million tons of Pumice and
Pumiceite, low royalty. Write

A. C. HAIGLER
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FOR SALE

(2) Steel Barges, 16' 4" x 60' 4", Double
Hull, Condition excellent. Located
Fort Smith, Arkansas. Price Each—
\$1,500.00

(1) "Sea Mule" Towboat, Steel Hull,
Twain Screw, 2 Chrysler Marine en-
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We have a large stock of repair parts,
boxes and pallets at prices less than new
parts. Write for list.

EQUIPMENT SERVICE COMPANY
Roanoke 4, Virginia
Phone Mr. Comer 8872 or write
P.O. Box 838

FOR SALE

- 1—1000-lb. Raw Rock Cement Scale
- 1—50 ft. Chain Bucket Elevator
- 1—10 H.P. Motor
- 1—Compressor
- 1—12x15 New Caldwell Circular wood
box—capacity 1000 cu. ft.

THE MCENERY COMPANY
1302 Myrtle St. Erie, Pa.

BLOCK PLANT FOR SALE

Complete Block plant with Stearns
No. 9 Jolterete, modern steam kilns,
complete with all buildings, mixers,
lift truck, etc. Only plant in mid-
western town of 30,000 and vicinity.
Plant site on long-term renewable
Railroad lease, at \$75 a year. \$30,-
000 takes all including inventory,
excepting acc'ts. receivable. Good
going business, owner is looking to
be called into service, must sell.
Write Box 1-99, Concrete Products,
309 W. Jackson Blvd., Chicago 6,
Ill.

- 1—Kent Tamper Striper with Vi-
brator Attachment
- 1—11 cu. ft. Kent Batch Mixer with
Elevator loader
- 700—8" Aluminum Pallets; 1000—
8" Steel cored Pallets
- 1—Stearns Model 7 Jolterete with
8" Attachments
- 1—18 cu. ft. Stearns Mixer; 1—18
ft. Skip loader
- 2000—8" 50% pallets; 200 Sash pal-
lets

Both of above machines can be seen
in operation. Box J-10, Concrete
Products, 309 W. Jackson Blvd., Chi-
cago 6, Ill.

FOR SALE

Crushed and sized cinder aggregate, test-
ed and approved for the manufacture of
cinder blocks. Write:

DULUTH CINDER, SLAG & STONE CO.
Box 116 Duluth 7, Minn.

FOR SALE

Brikrete Densifying Machine complete
with 8 inch and 4 inch molds, 1000
Plywood pallets, 2400 lbs. Brikrete ce-
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\$2700. Box J-5, Concrete Products, 309
W. Jackson Blvd. Chicago 6, Ill.

UNBREAKABLE PALLET RINGS

Write for full information
TEXAS FOUNDRIES
LUFKIN, TEXAS

FOR SALE

Septic tank forms for manufacturing
concrete septic tanks. Available in four
sizes. For further information as to price
and sizes, write to

YORK CONCRETE SEPTIC TANK FORMS
R. D. No. 1 York, Penna.

FOR SALE

One Model L-2, serial No. 7324. Auto-
matic Transportation Company Electric
Lift Truck complete with charger and
battery. Platform size 24"x63"

E. L. RAMM COMPANY
223 Tilden Ave. LaGrange, Ill.

FOR SALE

One Fargach Model 311, portable under cut ball,
type wet oscillator, 18"x36" equipped with 2HP, 40
cycle, 220 volt motor. New belt and sprockets. Con-
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One Fargach model 324.3. Ane portable truck
loader, 18"x20", equipped with 1 HP, 60 cycle,
220 volt motor. Condition very good. \$275.00.
Will take \$500.00 for each, 1 each Rock Hill, S. C.
ROCK HILL CONCRETE CO., INC.
Rock Hill, S. C. Phone 3776

NEW AND USED EQUIPMENT FOR SALE

- 15-Block Machines—All Makes and Capacities
 7-Batch Mixers—All Makes and Capacities
 4-Platform Lift Trucks
 1-Block Plant Fork Truck
 1-P.C.A. Jolt Machine
 17-New and Used Brick Machines
 Many Miscellaneous Items of block plant equip. Write for detailed list of all items and arrange to see the items of your interest.

Masonry Equipment & Engineering Co.
 325 E. Michigan Ave., Three Rivers, Mich.

FOR SALE—VALUE

See little flow equipment operating for the next 20 days.
 1—Skidder No. 2 Jolite with height control, power carriage and offsetting hoist.
 2—A-1 attachments
 2—new 8" skidder boxes
 1—12" skidder
 1—new 12" skidder box
 1—A-1 attachment
 1—28 Skidder No. 10
 All skidder units and racks for 100, 200, 400, 600, 800, 1000, 1200, 1400, 1600, 1800, 2000, 2200, 2400, 2600, 2800, 3000, 3200, 3400, 3600, 3800, 4000, 4200, 4400, 4600, 4800, 5000, 5200, 5400, 5600, 5800, 6000, 6200, 6400, 6600, 6800, 7000, 7200, 7400, 7600, 7800, 8000, 8200, 8400, 8600, 8800, 9000, 9200, 9400, 9600, 9800, 10000, 10200, 10400, 10600, 10800, 11000, 11200, 11400, 11600, 11800, 12000, 12200, 12400, 12600, 12800, 13000, 13200, 13400, 13600, 13800, 14000, 14200, 14400, 14600, 14800, 15000, 15200, 15400, 15600, 15800, 16000, 16200, 16400, 16600, 16800, 17000, 17200, 17400, 17600, 17800, 18000, 18200, 18400, 18600, 18800, 19000, 19200, 19400, 19600, 19800, 20000, 20200, 20400, 20600, 20800, 21000, 21200, 21400, 21600, 21800, 22000, 22200, 22400, 22600, 22800, 23000, 23200, 23400, 23600, 23800, 24000, 24200, 24400, 24600, 24800, 25000, 25200, 25400, 25600, 25800, 26000, 26200, 26400, 26600, 26800, 27000, 27200, 27400, 27600, 27800, 28000, 28200, 28400, 28600, 28800, 29000, 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A GOOD PICTURE is worth a thousand words in selling concrete masonry construction for homes, stores, farm improvements, factories, schools, public buildings and other structures.

You may not be able to show actual concrete masonry structures to all your prospects. You can show them a portfolio of photographs that display the beauty and utility of quality concrete masonry buildings.

The same photographs are valuable for illustrating your own advertisements and promotional material. Mounted attractively they make excellent window displays or inside exhibits in banks, savings and loan associations, other lending institutions or real estate offices.

Promotion-minded block manufacturers find it pays to keep a list—and photos—of quality concrete masonry buildings in their areas from which to select examples to show prospects. That's one of three basic ways to build business. Others are:

Make block that complies with ASTM and Federal specifications for moisture content, strength and water absorption. That ensures a quality product, the keystone of a good reputation.

Furnish prospects with names of architects and builders who can be depended on for designing and building quality concrete masonry structures.

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33 W. Grand Avenue, Chicago 10, Illinois

A national organization to improve and extend the uses of portland cement and concrete... through scientific research and engineering field work

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ONE MAN can deliver a septic tank with the CARPENTER DELIVERY RIG



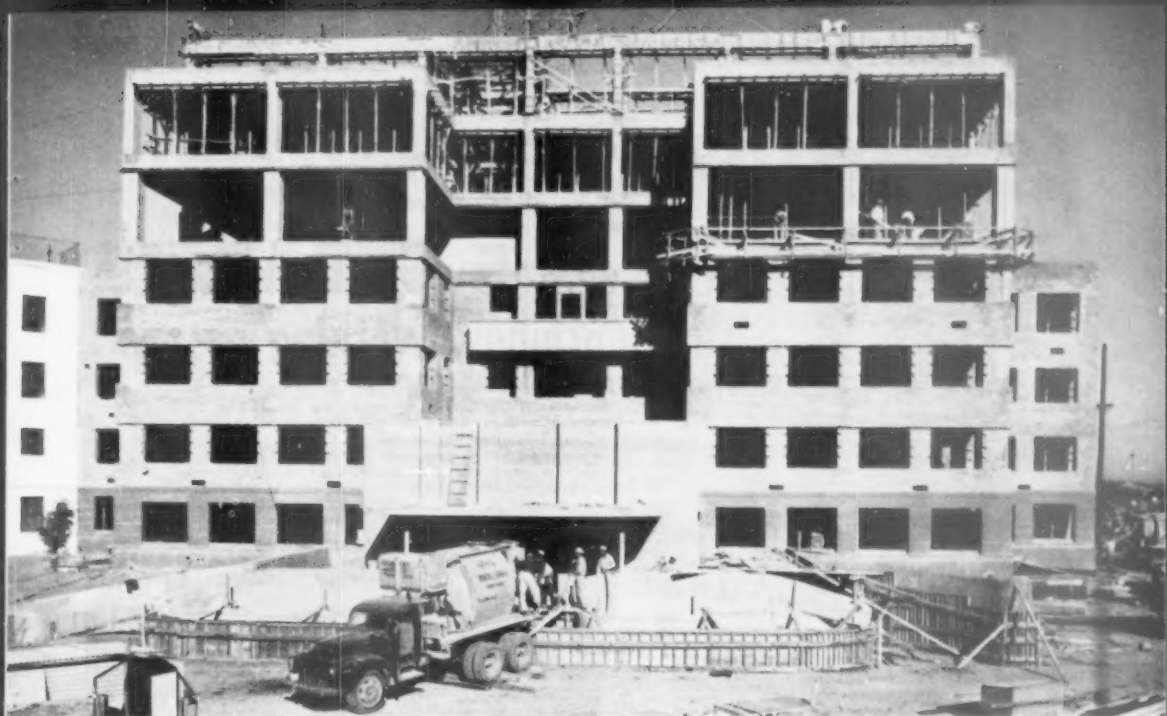
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Contr. — M. M. Sundt Construction Co. Pozzolith Ready-Mixed Concrete
Supplied by Tucson Rock & Sand Co. — all of Tucson, Arizona.

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Built with **POZZOLITH READY-MIXED CONCRETE**

Ready-mixed concrete—of ideal placeability and with designed strength—was produced for this modern hospital addition through the use of Pozzolith, the cement dispersing, water reducing admixture.

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3. LOW PERMEABILITY
4. GOOD APPEARANCE
5. ECONOMY

Over 500 leading ready-mixed plants in all parts of the country are producing Pozzolith Concrete . . . with the Pozzolith Automatic Dispenser—and an ever increasing number of top design engineers are specifying Pozzolith—for the above reasons.

Write for full information.

Over 500 Leading Ready-Mixed Plants
are now equipped with the
POZZOLITH
AUTOMATIC DISPENSER

WHY?

Because a producer can, at lower cost:

1. Produce concrete of low permeability . . . with normal Portland cement.
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3. Produce air entrained concrete without strength loss . . . with normal Portland cement.
4. Produce all of the above properties out of one cement bin . . . with normal Portland cement—stepping up production, reducing inconvenience in handling and cutting costs.

In normal mixes, concrete of any given durability, strength and workability, is produced more economically with Pozzolith than by any other means.

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CEMENT BLOCKS & SPECIALTIES
215 E. HARRIS AVE., ADRIAN, MICH.
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STEARN'S MANUFACTURING COMPANY, INC.
ADRIAN, MICHIGAN

Gentlemen:
I am sure Tiger's success with Stearns concrete block-making equipment is an old story to you through your friendly cooperative field men. But let me put it in writing.

When one man and one machine can replace four men and two machines, not only in quantity per shift, but in quality of work, it's something to tell the world about! That's the record of our Stearns 15, since its installation in February, 1940.

At the same time, as you will remember, you placed a Stearns 50-cu. ft. Mixer and a 50-cu. ft. Skip Loader in our plant, and later, a Stearns Pallet Return and a Magnetic Off-Bearer.

Never before in our entire 15 years manufacturing concrete block for the North Detroit area have we had such outstanding success as with these five modern Stearns achievements, designed and built to work together!

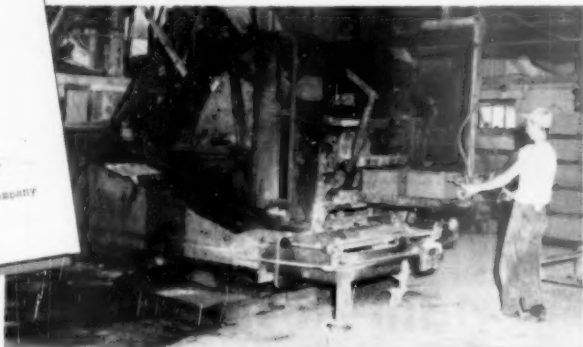
Very truly yours,

Knut Skeie
Knut Skeie, President
Tiger Cement Products Company



Three main cogs in the Tiger wheel. Knut Skeie, president, center; Art McGee, office manager, left; Bob Neien-dam, shop superintendent, right.

A small portion of Tiger's yard. Yesterday the whole foreground was filled. Tomorrow—the same.



Tiger Cement's office is bursting with orders for Stearns 15 concrete block. Part of the plant, left, background.



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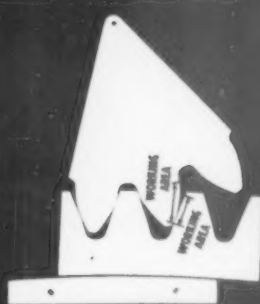
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Trailing tooth picks up load before preceding tooth loses contact.



There's more area for tooth contact with 20° long addendum tooth.



No gouging when gear tooth pulls away from pinion.

Big news for operators of grinding mills, rotary kilns, coolers, dryers! Allis-Chalmers offers new 20° involute cut tooth spur gear . . . developed after a comparative survey proved these gears the most effective for smooth operation and long gear life.

HERE'S WHY new 20° involute spur gear with long addendum pinion and short addendum gear tooth results in smooth, even distribution of force from pinion to gear:

1) Gear tooth *rolls* evenly on pinion tooth, not first rolling and then sliding. 2) Rolling action results in least friction wear. Pressure is lower because working force is distributed over 75% more tooth area. 3) Each gear tooth is 25% thicker at base, 25% stronger per inch of gear face.

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This improved gear is standard on new A-C equipment; can, in many cases, be obtained to replace existing gears without changing center to center distances. For more facts, call the Allis-Chalmers man in your area.

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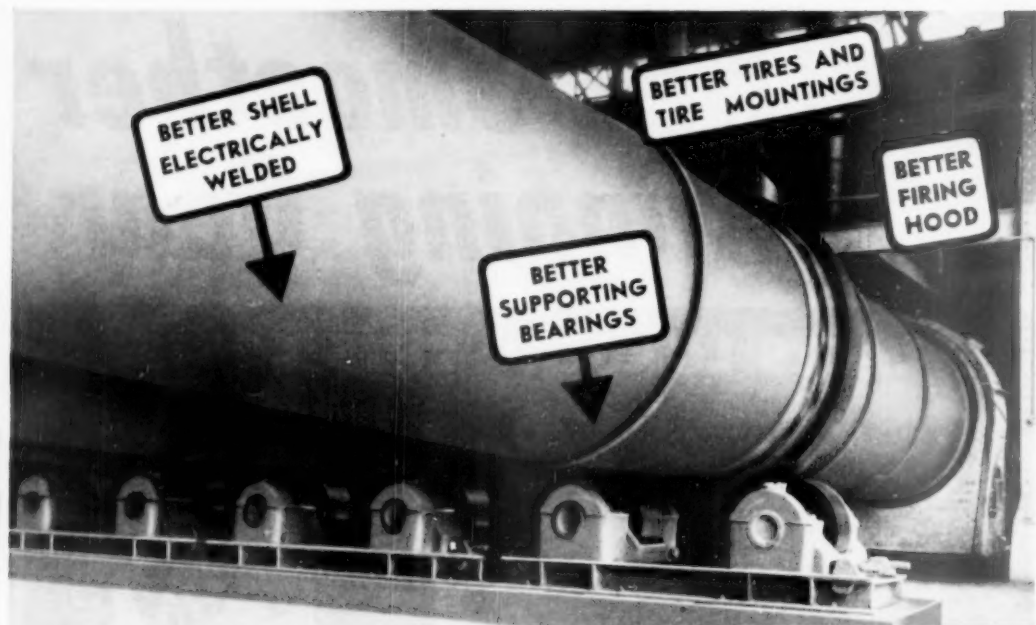


Crushers



Kilns, Coolers, Dryers





TROUBLE-FREE OPERATION

is the most important factor in keeping Rotary Kiln Costs down — and profits up. One breakdown can easily offset all of the savings achieved through careful firing and feeding for a long period of time.

That's why every part of every Vulcan Kiln is designed and built with an extra margin of protection against mechanical troubles of any kind and that's why long-time users of Vulcan Rotary Kilns, Coolers, Dryers, Retorts, etc. often order additional units from us without competition. They know that any necessary difference in first cost will be repaid many times over in greater freedom from breakdowns, shutdowns and other operating expense.



This Booklet Tells Why Vulcan Kilns Are Better

and why they give more years of trouble-free service. It's 28 fully-illustrated pages are packed with specific information regarding the design and construction of Vulcan Rotary Kilns, Coolers, Dryers and other related products. No charge or obligation. Write for Bulletin No. A-442. Give name of your company.



The illustrations above show a typical installation of Vulcan Rotary Kilns in a modern cement mill. Note the simple, sturdy design and construction — the entire elimination of any features that might invite mechanical trouble. The improved-type firing hoods were designed for burning pulverized coal but can easily be adapted for burning either gas or oil.

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Other Vulcan Products include Briquetting Machinery, Electric Hoists, Mining Machinery, Open Hearth Steel Castings, Heavy Special Machinery and all types of Industrial Locomotives. Bulletins on request.



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These are the famous Advance-Design features that help make

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TWO GREAT VALVE-IN-HEAD ENGINES: the 105-h.p. Loadmaster or the improved 92-h.p. Thriftmaster—to give you greater power per gallon, lower cost per load • POWER-JET CARBURETOR—smoother, quicker acceleration response • DIAPHRAGM SPRING CLUTCH for easy-action engagement • SYNCHRO-MESH TRANSMISSIONS for fast, smooth shifting • HYPOID REAR AXLES—for dependability and long life • DOUBLE-ARTICULATED BRAKES—for complete driver control • WIDE-BASE WHEELS for increased tire mileage • BALL-TYPE STEERING for easier handling • UNIT-DESIGN BODIES—for greater load protection • ADVANCE-DESIGN STYLING—for increased comfort and modern appearance.

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DETROIT 2, MICHIGAN



*First in demand
First in value
First in sales*

CHEVROLET ADVANCE-DESIGN TRUCKS

ROCK PRODUCTS, November, 1950

137

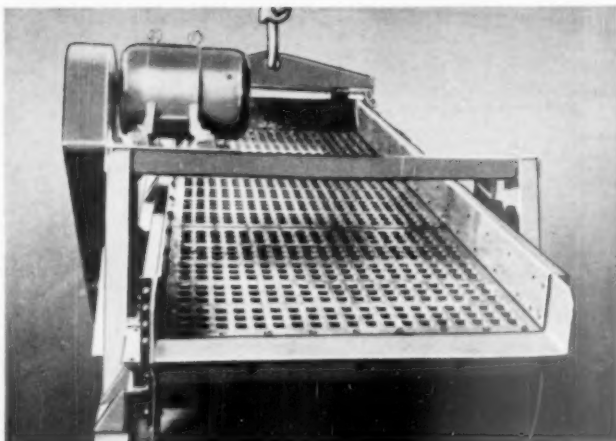
HENDRICK PERFORATED METAL PLATE

on a gyrating screen

This popular heavy-duty scalping unit is equipped with a 5'x14' Hendrick metal plate with square perforations.

Hendrick Perforated Plate can be supplied, either flat or corrugated, with any desired shape and size of perforation, in tank, high carbon, high tensile, and abrasion-resisting steels, and in other commercially rolled metals.

It maintains uniformity of mesh throughout an unusually long service life. Its full clearance obviates clogging, and the ease with which decks can be changed minimizes labor costs. Write for detailed information.



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Rebuilding Jaw Crusher Plates

with MANGATONE N.M.

**more than doubles life
of original plates**

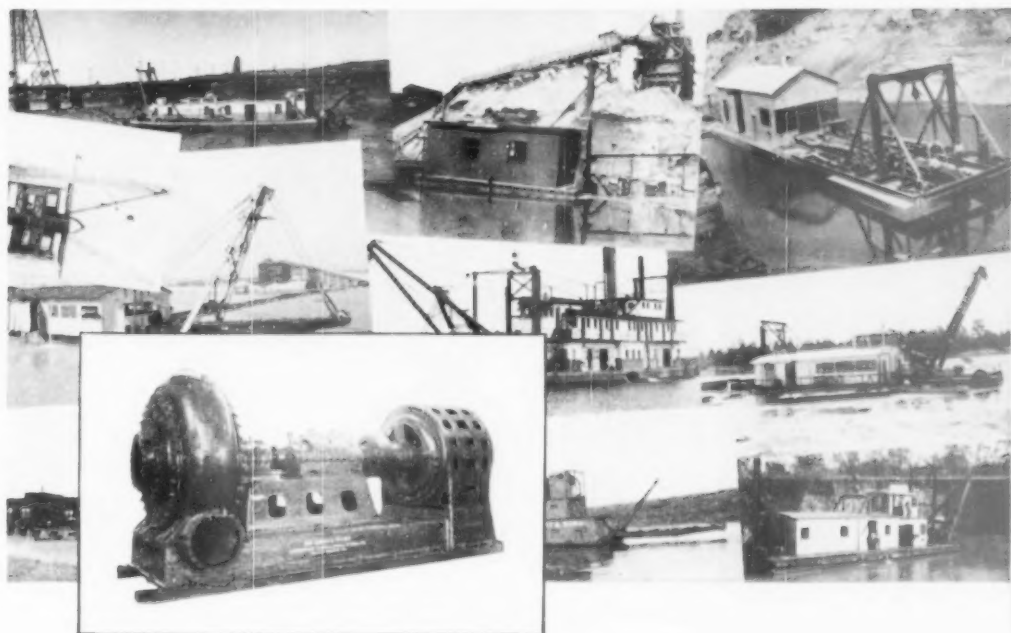
For many years, attempts to rebuild corrugations worn off crusher plates were unsatisfactory. Welding time and materials cost made the practice unprofitable, and usually the rebuilt plate was so badly warped as to render it useless.

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Your RESISTO-LOY Distributor, through the Two-Tone Shop, can rebuild your plates for a figure substantially less than the cost of new ones. Photograph shows a stack of rebuilt plates in one of our Two-Tone Shops. We do NOT recommend this as a job for the crushing plant maintenance welder, as proper rebuilding requires the use of special jigs and other expensive equipment. Why not call in the field man for a check-up on those used plates in your scrap pile?



Resisto-Loy Company, Manufacturers, Grand Rapids 7, Michigan



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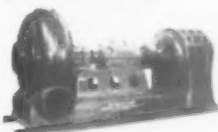
Why this outstanding preference? First, because profitable dredging requires high efficiency . . . second, because service records prove beyond question that tough manganese steel is the answer for long-wearing, trouble-free pump performance. *An Amsco Pump wins the profit battle against impact and abrasive wear.*

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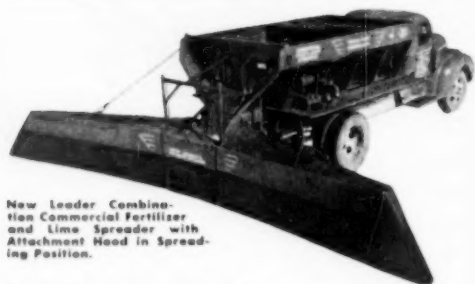


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ESTABLISHED 1872 ENTERPRISE, KANSAS, U.S.A.



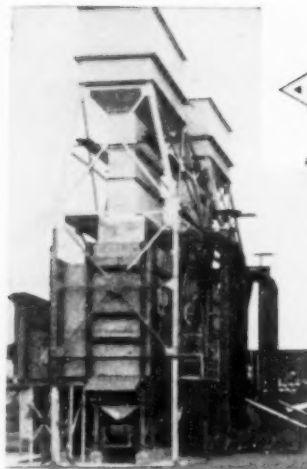
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Northern 400 1 1/2 yd. Diesel shovel
Northern Model 25 1 1/2 yd. Diesel shovel
Northern Model 27 1 1/2 yd. Diesel shovel
P&H 400 1 1/2 yd. Diesel shovel
Northern Model 8 1 1/2 yd. Diesel crane

CRUSHERS

JAW Crushers 19420, 19420, 19420, 19420, 19420
Cedar Rapids 19420, 19420, 19420, 19420, 19420
19420, 19420, 19420, 19420, 19420
Type C 19420, 19420, 19420, 19420, 19420
Type 19420, 19420, 19420, 19420, 19420
19420, 19420, 19420, 19420, 19420

GYRATORY: Allis-Chalmers McCully 40", 70", 8", 12", 20", 30", 40", 50", 60", 70", 80", 90", 100", 110", 120", 130", 140", 150", 160", 170", 180", 190", 200", 210", 220", 230", 240", 250", 260", 270", 280", 290", 300", 310", 320", 330", 340", 350", 360", 370", 380", 390", 400", 410", 420", 430", 440", 450", 460", 470", 480", 490", 500", 510", 520", 530", 540", 550", 560", 570", 580", 590", 600", 610", 620", 630", 640", 650", 660", 670", 680", 690", 700", 710", 720", 730", 740", 750", 760", 770", 780", 790", 800", 810", 820", 830", 840", 850", 860", 870", 880", 890", 900", 910", 920", 930", 940", 950", 960", 970", 980", 990", 1000", 1010", 1020", 1030", 1040", 1050", 1060", 1070", 1080", 1090", 1100", 1110", 1120", 1130", 1140", 1150", 1160", 1170", 1180", 1190", 1200", 1210", 1220", 1230", 1240", 1250", 1260", 1270", 1280", 1290", 1300", 1310", 1320", 1330", 1340", 1350", 1360", 1370", 1380", 1390", 1400", 1410", 1420", 1430", 1440", 1450", 1460", 1470", 1480", 1490", 1500", 1510", 1520", 1530", 1540", 1550", 1560", 1570", 1580", 1590", 1600", 1610", 1620", 1630", 1640", 1650", 1660", 1670", 1680", 1690", 1700", 1710", 1720", 1730", 1740", 1750", 1760", 1770", 1780", 1790", 1800", 1810", 1820", 1830", 1840", 1850", 1860", 1870", 1880", 1890", 1900", 1910", 1920", 1930", 1940", 1950", 1960", 1970", 1980", 1990", 2000", 2010", 2020", 2030", 2040", 2050", 2060", 2070", 2080", 2090", 2100", 2110", 2120", 2130", 2140", 2150", 2160", 2170", 2180", 2190", 2200", 2210", 2220", 2230", 2240", 2250", 2260", 2270", 2280", 2290", 2300", 2310", 2320", 2330", 2340", 2350", 2360", 2370", 2380", 2390", 2400", 2410", 2420", 2430", 2440", 2450", 2460", 2470", 2480", 2490", 2500", 2510", 2520", 2530", 2540", 2550", 2560", 2570", 2580", 2590", 2600", 2610", 2620", 2630", 2640", 2650", 2660", 2670", 2680", 2690", 2700", 2710", 2720", 2730", 2740", 2750", 2760", 2770", 2780", 2790", 2800", 2810", 2820", 2830", 2840", 2850", 2860", 2870", 2880", 2890", 2900", 2910", 2920", 2930", 2940", 2950", 2960", 2970", 2980", 2990", 3000", 3010", 3020", 3030", 3040", 3050", 3060", 3070", 3080", 3090", 3100", 3110", 3120", 3130", 3140", 3150", 3160", 3170", 3180", 3190", 3200", 3210", 3220", 3230", 3240", 3250", 3260", 3270", 3280", 3290", 3300", 3310", 3320", 3330", 3340", 3350", 3360", 3370", 3380", 3390", 3400", 3410", 3420", 3430", 3440", 3450", 3460", 3470", 3480", 3490", 3500", 3510", 3520", 3530", 3540", 3550", 3560", 3570", 3580", 3590", 3600", 3610", 3620", 3630", 3640", 3650", 3660", 3670", 3680", 3690", 3700", 3710", 3720", 3730", 3740", 3750", 3760", 3770", 3780", 3790", 3800", 3810", 3820", 3830", 3840", 3850", 3860", 3870", 3880", 3890", 3900", 3910", 3920", 3930", 3940", 3950", 3960", 3970", 3980", 3990", 4000", 4010", 4020", 4030", 4040", 4050", 4060", 4070", 4080", 4090", 4100", 4110", 4120", 4130", 4140", 4150", 4160", 4170", 4180", 4190", 4200", 4210", 4220", 4230", 4240", 4250", 4260", 4270", 4280", 4290", 4300", 4310", 4320", 4330", 4340", 4350", 4360", 4370", 4380", 4390", 4400", 4410", 4420", 4430", 4440", 4450", 4460", 4470", 4480", 4490", 4500", 4510", 4520", 4530", 4540", 4550", 4560", 4570", 4580", 4590", 4600", 4610", 4620", 4630", 4640", 4650", 4660", 4670", 4680", 4690", 4700", 4710", 4720", 4730", 4740", 4750", 4760", 4770", 4780", 4790", 4800", 4810", 4820", 4830", 4840", 4850", 4860", 4870", 4880", 4890", 4900", 4910", 4920", 4930", 4940", 4950", 4960", 4970", 4980", 4990, 5000

ROLL: Allis-Chalmers 19420, 19420, 19420, 19420, 19420
Northern 19420, 19420, 19420, 19420, 19420
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HAMMER MILL: 19420, 19420, 19420, 19420, 19420
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BALL MILL: Allis-Chalmers 19420, 19420, 19420, 19420, 19420
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ROD MILL: 19420, 19420, 19420, 19420, 19420
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PULVERIZER: 19420, 19420, 19420, 19420, 19420
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TUBE MILL: Allis-Chalmers 19420, 19420, 19420, 19420, 19420
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PEBBLE MILL: 19420, 19420, 19420, 19420, 19420
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RAYMOND MILL: 19420, 19420, 19420, 19420, 19420
Northern 19420, 19420, 19420, 19420, 19420
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TRANSIT MIXERS

2 REX 1 1/2 yd. 19420, 19420, 19420, 19420, 19420
SMITH 1 1/2 yd. 19420, 19420, 19420, 19420, 19420
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1 REX 1 1/2 yd. 19420, 19420, 19420, 19420, 19420
SMITH 1 1/2 yd. 19420, 19420, 19420, 19420, 19420
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1 REX 1 1/2 yd. 19420, 19420, 19420, 19420, 19420
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1 REX 1 1/2 yd. 19420, 19420, 19420, 19420, 19420
SMITH 1 1/2 yd. 19420, 19420, 19420, 19420, 19420
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SCREENS AND CLASSIFIERS

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AIR COMPRESSORS

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READY-MIX CONCRETE PLANTS

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ASPHALT AND CRUSHING PLANTS

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BUCKET ELEVATORS

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DERRICKS

19420, 19420, 19420, 19420, 19420
Northern 19420, 19420, 19420, 19420, 19420
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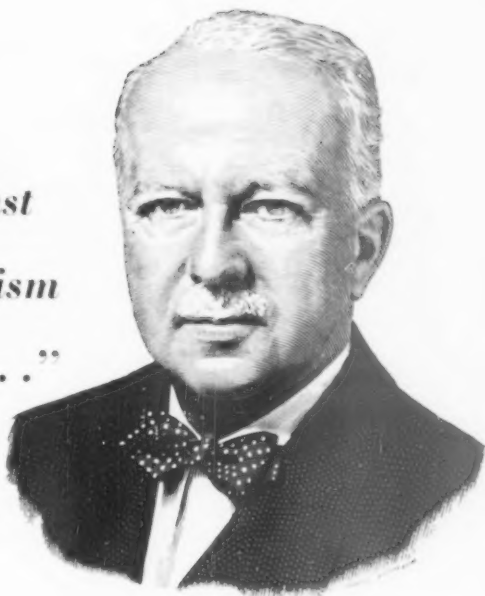
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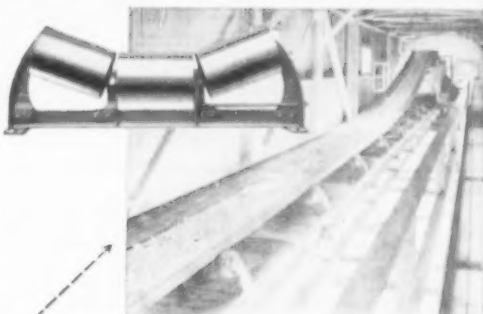
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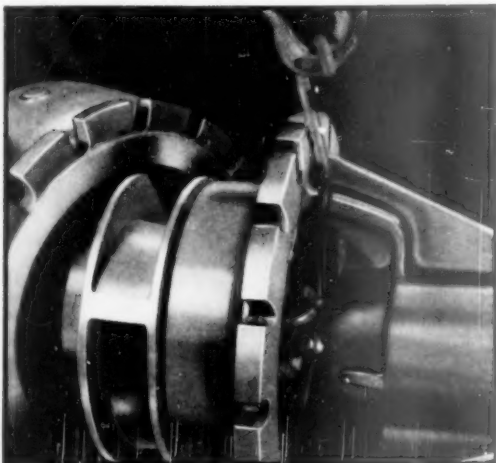
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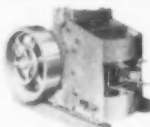
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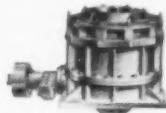
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